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Art. I.—THE AMERICAN ELECTRO-MAGNETIC TELEGRAPH.

By Hon. Amos Kendall.

An extract from an Argument submitted to the Supreme Court of the United States.

Seldom, if ever, has a more important case been brought before the Supreme Court of the United States for its decision.

It is important on account of the pecuniary interests involved in it; it is important as involving the fame of a distinguished citizen, and through him, to some extent, the fame of our common country. It is transcendently important in the principles of patent law which it presents for final decision by this tribunal.

It is now to be tested whether Prof. Morse is to share the fate of so many distinguished inventors, who have gone before him; whether individuals or the public, eager to possess the fruits of his mental labor before they rightfully become public property, shall be permitted to gratify their cupidity; whether Prof. Morse, like the inventor of the cotton gin, is to lose the profits of his invention, while thousands of his instruments, the originality of which no man doubts, resound throughout the land, almost in the presence of the tribunal which must decide upon his patents.

It is now to be tested, whether American courts are hereafter to consider patent privileges as the price paid by the Government for the fruits of mental labor, to be held as sacred from piracy, theft, or trespass, as any other species of private property; or whether, like the English courts for a long period, now happily at an end, they are still to confound them with

odious monopolies, of what, before the issue of the special grants, had become the property of the public.

It is now to be tested, whether American courts, as the English courts so long did, are hereafter to look to machinery or instrumentalities as the only objects to be protected by patents, and avail themselves of errors or variances in structure or description, not fatal to the result, for the purpose of annulling patent rights; or whether they shall look through the means to the end, as the real object of protection, and in their decisions secure the results to the inventor, if arrived at by any mode intelligibly described by him, especially if the process be new.

We confidently assert, that if this court come up to the principles established by the highest courts in England, enough is *admitted* by our adversaries to entitle us to a decree in our favor.

A leading principle decided in England is, that when an inventor has by a new principle or a new application of a known principle, power or substance, produced a new result, or an improved result, and has intelligibly described the manner in which he uses those means, they being of his own invention, and has patented his means, nobody can deprive him of the exclusive use of his new principle, or new application, or new result, by any improved or different means.

At page 11 of Mr. Chase's printed argument, he asks, "What Morse actually invented?" and he proceeds to reply, "*He invented the first practically useful* MARKING *Telegraph.*" "The evidence in this case," says he, "I freely admit must satisfy the court, that though his patent and the practical application of his invention, were subsequent in date to some foreign patents and to the actual construction of some foreign telegraphs, still, his was the first practically usefully marking telegraph. *For that telegraph, beyond a doubt, he was entitled to a patent.*"

It is also admitted, that Morse invented the means by which this new and useful result was accomplished. "Morse," says the learned counsel, attached a marker to the armature of the magnet. He brought the paper and its revolving cylinder within the stroke of the marker. He adopted a contrivance for withdrawing the marker from contact with the paper at the instant of the cessation of the magnetic impulse. The combination of these contrivances, with the known means of operation from the distant station, enabled him to produce marks at a distance, &c."

Again: "It occurred to him [Morse] that the motion which previous discoverers and inventors had been able to produce by means of electro-magnetism, might be made to mark dots and horizontal lines. *A simple contrivance sufficed for this.*"

Though we by no means concede, that these admissions cover all of Morse's invention, or any considerable part of it, yet they cover enough to secure to him not only those means, but the new result obtained by their use. Having been the *first* to invent a *practically useful* marking Electro-Magnetic Telegraph by *any* contrivances, however simple, which "occurred to him," or were by him invented, and which he has intelligibly described in his patent, he is entitled to the exclusive use of *marking* for telegraphic purposes by any mode in which Electro-Magnetism is the essential agent. There are in fact two distinct grounds on which his general claim rests.

First. He makes a new application of a known power to produce an useful result.

Secondly. He produces a useful result never before produced by any power.

But for one branch of our argument, the two may be resolved into one,—*a new result produced by a new application of a known power*,—a result which our adversaries admit to be new and produced by means of contrivances which they admit to be his.

There are many cases in the English books tending to establish the principle that an inventor, who has produced a new result or a result in any degree useful by a new application of a known agent, may, by giving to the public an intelligible description of the means he uses, those means being of his own invention, secure to himself through a patent for the means, an exclusive right to the new application and its result against interference by any other means. The leading case, and the only one it is necessary to present in any detail, is that of Neilson's Patent for what was called *the Hot Air Blast.*

Cold air injected by a bellows had previously been used to produce heat in furnaces employed in the production and manufacture of iron. Neilson perceived that a large portion of the heat generated in the furnace, was absorbed in heating the cold air, and he conceived the idea that if the air could be heated before it went into the furnace, the heat of the furnace-fire absorbed in that process, would be saved, by which means the furnace could be made much hotter. To carry out his idea he constructed and patented a clumsy iron box placed between the blower and furnace through which the air must pass, and under the box he put a fire to heat the air in its transit.

His patent was denominated, a patent "*for the improved application of air to produce heat in fires, forges, and furnaces where bellows or other blowing apparatus are required,*" the only instrumentality described being the iron box with a fire under it between the blower and the furnace.

The discovery proved to be of vast public utility, and his mode of heating the air was greatly improved by various devices, among which was the substitution of iron pipes for his clumsy iron box. The parties who had substituted other modes for heating the air, maintained, as the appellants in this case do, that Neilson's patent was for *his mode of heating the air only*, and as they used different modes, they were not infringers.

Neilson on the other hand maintained, that being the first to conceive the idea, and having rendered it useful by *one* mode of his own invention, he was entitled to the exclusive right of using the hot blast by *all* modes during the existence of his patent. The opposing Council in that case, as our adversaries do in this, insisted that the patentee was entitled only to the mode described in his patent, that a patent covering all modes would be a patent for a principle; and they were alert as our adversaries are in this case, to point out how very little the patentee had invented. And little indeed it was in that case. The manufacture of iron was old; the furnace was old; the fuel was old; the blower was old; hot air was old; iron boxes were old;—not a single new thing was used by him—nothing equal to the "simplest contrivance" in Morse's Telegraph. He did nothing whatever in the way of invention, but to put a few old things together, and that not in a very satisfactory manner.

The reported litigation upon this patent occupies upwards of 150 pages in Webster's Reports of Patent Cases. It was contested with all the talent, zeal and perseverance which unlimited means could command: after appearing in various shapes in the English Courts, a case involving its validity and extent went by appeal from the Court of Sessions in Scotland up to the House of Lords.

A long, lucid, and most able charge was given to the Jury by the Court below, to which exceptions were taken; and upon those exceptions, the case was taken up. To show distinctly that the House of Lords decided upon the question now at issue, we are obliged to quote somewhat extensively from this charge to the jury. In that address the learned Judge spoke as follows: viz.

"It is quite true, that a patent cannot be taken out solely for an abstract philosophical principle: for instance for any law of nature, or any property of matter apart from any mode of turning it to account in the practical operations of manufacture, or to the business, and arts, and utilities of life. The mere discovery of such a principle, is not an invention in the patent law-sense of the term. Stating such a principle in a patent, may be a promulgation of the principle, but it is no application of the principle to any practical purpose; and without that application of the principle to a practical object and end, and without the

application of it to human industry, or to the purposes of human enjoyment, a person cannot in the abstract, appropriate a principle to himself. But a patent will be good, though the subject of the patent consists in the discovery of a great, general, and most comprehensive principle in science or law of nature, if that principle is by the specification applied to any special purpose, so as thereby to effectuate a practical result and benefit not previously attained.

"The main merit, the most important part of the invention may consist in the conception of the original idea—in the discovery of the principle in science, or of the law of nature, stated in the patent, and little or no pains may have been taken in working out the best manner and mode of the application of the principle to the purpose set forth in the patent. But still, if the principle is stated to be applicable to any special purpose, so as to produce any result previously unknown in the way and for the objects described, the patent is good. It is no longer an abstract principle. It comes to be a principle turned to account, to a practical object, and applied to a special result. It becomes then not an abstract principle, which means a principle considered apart from any special purpose or practical operation, but the discovery and statement of a principle for a special purpose, that is, a practical invention, a mode of carrying a principle into effect. That such is the law, if a well-known principle is applied for the first time to produce a practical result for a special purpose, has never been disputed.

"It would be very strange and unjust to refuse the same legal effect, when the inventor has the additional merit of discovering the principle, as well as its application to a practical object. The instant that a principle, although discovered for the first time, is stated, in actual application to, and as the agent of, producing a certain specified effect, it is no longer an abstract principle; it is then clothed with the language of practical application, and receives the impress of tangible direction to the actual business of human life. Is it any objection then, in the next place, to such a patent, that terms descriptive of the application to a certain specified result, include every mode of applying the principle or agent so as to produce that specified result, although one mode may not be described more than another? Although one mode may be infinitely better than another, although much greater benefit would result from the application of the principle by one method, than by another—although one method may be much less expensive than another? Is it, I next inquire, an objection to the patent, that in its application of a new principle to a certain specified result, it includes every variety of mode of applying the principle according to the general state-

ment of the object and benefit to be attained? You will observe that the greater part of the Defendant's case is truly directed to this objection. This is a question of law, and I must tell you distinctly, that this generality of claim, that is, for all modes of applying the principle to the purpose specified, according to, or within a general statement of the object to be attained, and of the use to be made of the agent to be so applied, is no objection whatever to the patent. That the application or the use of the agent for the purpose specified, may be carried out in a great variety of ways, only shows the beauty, and simplicity, and comprehensiveness of the invention. But the scientific and general utility of the proposed application of the principle, if directed to a specified purpose, is not an objection to its becoming the subject of a patent.

"That the proposed application may be very generally adopted in a great variety of ways, is the merit of the invention, not a legal objection to the patent."

* * * * * *

"I state to you the law to be, that you may obtain a patent for a mode of carrying a principle into effect; and if you suggest and discover, not only the principle, but suggest and invent how it may be applied to a practical result by mechanical contrivance and apparatus, and show that you are aware that no particular sort, or modification, or form of the apparatus is essential in order to obtain benefit from the principle, then you may take your patent for the mode of carrying it into effect, and are not under the necessity of describing and confining yourself to one form of apparatus. If that were necessary, you see what would be the result. Why that a patent could hardly ever be obtained for any mode of carrying a newly discovered principle into practical results, though the most valuable of all discoveries. For the best form and shape, or modification of apparatus, cannot, in matters of such vast range, and requiring observation on such a great scale, be attained at once; and so the thing would become known, and so the right lost, long before all the various kinds of apparatus could be tried. Hence you may generally claim the mode of carrying the principle into effect by mechanical contrivance, so that any sort of apparatus applied in the way stated, will, more or less, produce the benefit, and you are not tied down to any form."

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"I have to tell you in point of law, that under this patent not claiming any or the best contrivance for heating the air, and at the least expense and trouble, the result which actually followed, viz.: that persons in the trade and acting on the patent, contrived from time to time, a great variety of contrivances more or less valuable or costly, and at last came to settle generally into

one form as better than others, was exactly the result which might be expected to follow under a patent of this general character, and that if the patent is good in law, then it gave no form of apparatus for heating air, but claimed the contrivance generally, of heating the blast for the effect and end of producing heat in the furnace. The only point for you is, will any contrivance which heats the blast, produce that beneficial effect and end?"

The subject was fully discussed by Counsel before the House of Lords, and by the Lords themselves, and that august Tribunal, so far as appears, without a dissenting voice, decided the law to be as laid down in the foregoing extracts from the charge to the Jury.

On that occasion Lord Campbell made the following remarks, viz.:

"The other exceptions, till we come to the 11th, turn upon the construction of the patent. Now in one stage of these proceedings, I certainly did entertain some doubt on that subject. But after the construction put upon it by the learned Judges of the Exchequer, sanctioned by the high authority of my noble and learned friend now upon the woolsack, when presiding in the Court of Chancery, I think the patent must be taken to extend to all machines of whatever construction, whereby the air is heated intermediately between the blowing apparatus and the blast furnace. That being so, the learned Judge was perfectly justified in telling the Jury, that it was unnecessary for them to compare one apparatus with another, because, confessedly, that system of conduit pipes was a mode of heating air by an intermediate vessel between the blowing apparatus and the blast furnace, and therefore it was an infraction of the patent."

Thus it was decided by the Courts of England and Scotland, including the House of Lords, substantially in the language of the exceptions, that the patentee, being the discoverer of a new principle, and the inventor of means, however simple and imperfect, by which he has rendered it in *some* degree *useful*, may "*claim or maintain that his patent is one which applies to all varieties in the apparatus which may be employed in heating air while under blast*," and is "*not limited to a particular apparatus described in the specification*"—that it is "*in point of law no objection to the validity of such a patent that it included every mode of applying the principle or agent so as to produce the specified result, although one mode may not be described more than another, although one mode may be infinitely better than another, although much greater benefit would result from the application of the principle by one method, than another; although one method be much less expensive than another, and that this generality of claim, that is, for all modes of applying the principle to the purpose specified, according to, or within*

the general statement of the object to be obtained, and of the use to be made of the agent to be applied, is no objection whatever to the patent."

But it is distinctly laid down in the same case, that the patentee, if he wishes to enjoy his invention thus broadly, must take care in his specification not to confine himself to the single mode described by him; otherwise he will be confined to that mode. *Webster's Patent Cases*, pp. 679, 682, 688, 698, *Ex.* 6.

As well in the facts as in the law, there is a remarkable analogy between Neilson's patent for the hot air blast and Morse's patent for the Electro-Magnetic Telegraph. In Neilson's case the *ultimate* result was the manufacture of iron which was old.

In Morse's case, the ultimate result was the telegraphic communication of ideas from one mind to another, which was old.

In Neilson's case, the furnace, the fuel, the fire, the ore, the hot air, the blower and iron boxes, were old.

In Morse's case, the clockwork, the paper, dots and dashes, galvanic electricity, the battery, the circuit, the electro magnet, and the key were old.

Neilson put the old parts together in such manner as to heat the air in its transit, though he did not claim heating the air, without even a "simple contrivance" of his own invention.

Morse put the old parts together, by a port rule to regulate the pulsations of the electric current so as to make the dots and dashes of any desired length, by a contrivance to regulate the motion of the paper to receive them, by the pen or pencil in the first patent to delineate them, and the pen-point and grooved roller in his second patent to indent them, and by combined and local circuits.

In Neilson's case, the clumsy iron box in his combination, which was *the only patentable part* of his invention, was immediately abandoned in practice, being superseded by coils of pipe in which the air could be heated to a higher degree of temperature; but in the case of Morse, it is his own invented forms and combinations *now in use* unimproved, which make his Telegraph.

True, his port rule which forms *a part* of his invention, is not used, because, in common business, the end can be better attained without it; but this constituted a small part of his patentable invention.

Though the *whole* of Neilson's patentable invention was abandoned in practice, yet the British Courts of highest resort sustained his claim to the exclusive use of hot air applied to furnaces: And on what ground? On the ground, that *he was the first to devise and describe the means of applying the hot air*, no matter how bungling or imperfect those means were, if they were such as to make the application *to any degree useful.*

They decided that he was entitled to *the whole principle and effect*, because that was his real invention, and although it was

necessary for him to devise and describe *some* plan by which the object could be attained, when he had described *one* such mode, *it carried with it all modes.* They do indeed lay down one exception to this rule, dependent however, on the patentee himself. It is where the patentee so frames his specification as to imply that he intends to confine himself to the mode described by him. In that event he is entitled to nothing beyond that particular mode. Neilson avoided that restriction, by declaring in his specification, that the size and shape of the box in which the air was to be heated, and the manner of heating the air, were immaterial. Morse avoids it by directly declaring, after he has described his machinery, that he does not propose to confine himself to it, but claims all modes wherein the same application of power is employed to attain the same end, both the application and end being new. And the Court will not fail to remark, that such a declaration, or something equivalent to it, was absolutely necessary to bring Morse's invention within the protection of the law as laid down in Neilson's case.

With this exposition, we confidently submit, that, upon the *admissions* of our adversaries, that by a few simple contrivances of Morse's invention, described in his specification, he has produced "the first practically useful Electro-Magnetic *Marking* Telegraph," he is entitled to the protection of this court against all other Electro-Magnetic *Marking* Telegraphs, whatever may be their form or modes of operation.

But our adversaries while admitting facts sufficient to entitle us to protection under the law as laid down in Neilson's case, resolutely contest the law itself. They sing us the old song with all its variations, that *principles*, *effects*, and *results* cannot be patented.

So, in the same sense, *Machines*, or *means* cannot be patented. An *abstract machine* is no more patentable, than an *abstract principle* or *result.* Go to the Patent Office with the most beautiful machine ever devised, seeming to perform evolutions more wonderful and sublime than those of the Heavenly spheres, and tell them you want a patent for it. They will ask you the very commonplace question, "*of what use is your beautiful machine? What* USEFUL RESULT *do you accomplish by it?*" If you reply "I don't know, I have not yet studied that out," they will tell you "you *must* know,—you *must* not only study that out, but you *must give us an intelligible description of it* before we can give you a patent."

Go to the Patent Office and tell them, that you have discovered a *principle*, or achieved a *result*, more important to the wealth, comfort, and happiness of mankind than all discoveries and inventions which have been made from creation down to this day, and ask a patent for it. They will ask you *how you*

apply the principle so as to produce any useful result, or *how* you produce a result so astonishing? If you answer that you do not choose to tell, or have yet to study that out, they will tell you, that you must not only study it out, but give them an intelligible description of it, before they can give you a patent for it.

Every cause has its effect, and every effect its cause. Machines and their results in the eye of the patent law, cannot be separated. They come into existence together, and march, *pari passu*, hand in hand. They are the body and the soul. Without the soul the body is dead, and protection would be useless; without the body, the soul needs no human protection. It is *body and soul united*, which need the protection of human laws, and it is only body and soul united that such laws are designed to protect.

In the beginning of invention, every *new machine* produced a *new result.* They formed the basis of all subsequent improvements. By the principles of justice as well as patent law, the first inventor was entitled to be protected *both in his machine and his result*, in the one as well as in the other, both being his property, the fruits of his mental and manual labor. The second inventor by *an improved machine* might produce an *improved result*, and would be entitled to protection for his improvement and for his improvement only. It would be as unjust to let him deprive me of my result because he has improved it, as of my *machine* because he has improved that. He cannot build on my foundation without my leave, but having purchased my machine and results, he adds his improvements, and enjoys the whole together. The first inventor is entitled to the *whole* result; the second to his improvement upon it; so also the third, and so on. But gradations in results are not so easily distinguished as alterations in machinery, and as they both go together, the law attempts to define and protect an improvement in the result, through the improvement of machinery by which it is produced. When it speaks of a new and useful machine, it means a machine which produces a new and useful result; and when it speaks of a new and useful improvement, it means one that produces an improvement in the result. To understand the meaning of the law, we must look upon the machine and its result as *one*,—one in origin, one in object, and one in the eye of the law.

But our adversaries, like multitudes of others, separate machines from their results, and seem to think the former the only objects which the patent laws are designed to protect. We hold, on the contrary, that the ultimate object of the patent laws is, *the protection of results*, and so far as they are applicable to the protection of machines, the object is to *protect the result through*

protection of the machine. Of what use is protection of the machine, if the result be not protected? Of what value is the machine to the patentee, or the public, except for the results it produces?

We need not tell this court, that patents in England were originally for new results, "new manufactures"—without regard to the manner in which they were produced. No specification of means or machinery was required. The fact that a man produced an useful result, was all that was required; and for the result only the patent was granted. This patent protected him against any person who should produce the same result by any means whatsoever.

What was the object of the specification afterwards required? Not, certainly, to enable others to deprive the patentee of his result by improving upon his means or substituting others; but simply to enable others to understand how he arrived at that result, that the public might have the full benefit of it after the expiration of his exclusive right. The first expedient resorted to for the purpose of enabling the public to avail itself of the invention after the patent had expired, was to require the patentee to instruct a certain number of apprentices in his art and mystery, who might go out and teach it to others. This was made a condition on which the exclusive use was guaranteed by a patent. This gave place to the written specification which was an improved mode of arriving at the same end.

There is a contract between the inventor and the public. The inventor says, I have accomplished an object never before accomplished, I have produced a result—"a new manufacture"—never before produced, of vast public utility. The government says to him, if you will make known the means by which you attain that end, so that the public will have the benefit of it after your patent expires, we will secure to you all the benefits of your result for fourteen years. The bargain is struck. The inventor reveals his secret; the government gives him a solemn contract of protection; and then, nine times out of ten, suffers him to be plundered, if not ruined by the uses made of the very secret he discloses!

Morse comes to the government with his ribbon of paper, imprinted with letters Roman, Greek, Hebrew or *Morsaic*, and says, I have produced this new and astounding result instantaneously, standing a thousand miles distant from the printing apparatus, and I ask a patent for it. A patent under the old English law would have given him the exclusive benefit of his result for the patent term; but the government says to him, "you must inform the public how you do this wonderful thing, and then we will give you a patent securing to you the exclusive use of it for fourteen years." Morse says "if I inform the

public how I do it, you will let others, who perchance get their notions from my description, come in by some improvements real or pretended, and take from me all the benefits of my invention." The government assures him that the only object and legal effect of his description will be to enable the public to use his art after his patent expires. How far that assurance has been verified is shown by the open use of his invention on thousands of miles of line, in bold defiance of his patented rights.

It takes a long time to change the current of the public mind when it becomes concentrated in one deep channel, however devious from the line of right. You might as well attempt to make the Mississippi run straight by throwing pebbles into its curves, as to think by one or a hundred arguments to overcome unjust prejudices and opinions impressed on the public mind by the precedents of ages. In no portion of human affairs is this fact so conspicuous as in the profession of law, wherein most judges believe it their duty to think just as their predecessors did, and it is the pride of the lawyer that he is able to array a consecutive file of precedents extending back to black-letter age, since which a trifling error then originating, has, by the natural effect of adding precedent, accumulated like the rolling snow-ball, until it has become an enormous wrong.

We need not enter into a history of the English patent laws which are the ancestors of our own. It is sufficient to say, that the granting of patents for new inventions and for monopolies in trade and manufactures were in ancient times a royal prerogative in England, and there was no recognized distinction between patents for old things and for new. The royal prerogative was so enormously abused as to create a general abhorrence of patents of every sort, and the judges of England sought every pretext for declaring them void. At length they were all swept away with a few exceptions, by an act of parliament, and the prerogative of the king was limited to grants of exclusive privileges for limited terms to those only who devised or introduced some new manufacture, useful to trade, and beneficial to the public.

But the current of the judicial mind in England had long been running against all patents, and could not be suddenly changed. It still set against patents for new inventions, as it had done against the old monopolies; and when the specification was introduced, it was immediately perverted from its true object and used as a means of destroying a right, the protection of which was the sole object of the inventor in making it public. Even now, though a great change has been wrought in the judicial mind of England and America, the odium of the old monopolies in some degree attaches to patents, and something in-

cluded in the specification which ought to have been omitted, or something omitted, which ought to have been included, though that instrument enables everybody distinctly to understand the invention, and how to use it, is seized upon as a pretext for annulling the grant altogether.

These are hard cases. The man's invention is his own; the government buys it of him for a price, and on a condition. He complies with the condition as well as he knows how, and under the instructions of officers of the government itself, appointed to advise and correct him if there be anything wrong in his papers. But some error is discovered by an astute lawyer in the specification, an error never thought of by him, nor suspected in the Patent Office, and his patent is declared void. The protection of the government is withdrawn from his invention, but his property is not restored. It is gone for ever, not from any fault of his, but because two public authorities, one in the Patent Office, the other in the courts, differ in opinion upon some point of his specification.

We trust the day is passed when pretexts were sought to get rid of these contracts between government and citizen. Morse comes and exhibits the result of his invention—*the printing of telegraphic characters at any distances.* All he asks is, that protection which the law would give him if no specification of means had ever been required. It is just that, and nothing more, which he has attempted to secure through his specification. It is just that, and nothing less, which his government has promised him. It is protection for *his art*—his *embodied* art, and our adversaries admit that "without doubt" such "an art can be patented,—the statute says so expressly."

Art. II.—GEOGRAPHY OF THE ATLANTIC OCEAN.*

THE WINDS AND THE CURRENTS—TIDES AND THE SEAS—DEPTH OF THE OCEAN—OCEAN TELEGRAPH PRACTICABLE.

THE time is probably not far distant when the popular will, no less than the enlightened good sense of the statesmen of the country will settle practically how far the government of the Union may be permitted "to provide for the general welfare," by the encouragement of science. Custom in such matters, whence no further usurpations can possibly arise, becomes almost as authoritative as a constitutional sanction; and unless we greatly misapprehend the character of the American people, few will be disposed to blame herein a leaning to the liberal

* From De Bow's Review.

side. The temptation to aid the national genius in the acquisition of those unfading laurels, awarded by universal consent to the successful discoverer of what is truly great and widely useful in these fields, might tempt the most rigid constructionist to relax here his rules, and admit, if possible, an exception to his political creed. The fame of one illustrious philosopher, one of the founders of American independence, is already blended with the history of human thought as well as political enfranchisement; and whether the spirit in which he pursued knowledge, or the magnitude of his additions to the common stock, are considered, it must be admitted that his example still modifies all legitimate inquiry into the august secrets of nature. The era of Franklin was but the dawn of modern science. The laws, the modifications, and the analogies of light, heat, chemical affinities, and electricity, in its Protæan forms, were then just emerging to human ken. The stone tables, on which, as on the leaves of a book, the earth's history are imprinted, were at that time united by unbroken seals. Observation had not yet accumulated a mass of records, nor been sufficiently extended to trace the varying intensities of the great powers of nature over the surface of the earth, and thus create a true philosophic geography. It is worthy of mention, that one of the most important features of our planet was pointed out by the great Franklin, and that he traced that portion of the ocean stream which rushes past our shores, and bestows on Western Europe its genial and temperate climate, its fertilizing showers, and abundant harvests. Since that period there have been travelers like Humboldt and Von Buch, who have measured mountains and gauged streams, watched the fires of the volcano, and explored the causes of those powers that sweep the surface or shake the depths of the earth. Every year the number of observers is increased; the circle of stations at which these investigations are prosecuted is continually widening; while commerce, allured by the promises of greater and more certain gains, bids fair soon to be pressed into the zealous service of science. Physical geography, the most attractive of the departments of the study of Nature, embracing the view and discussion of her phenomena on the widest field that man can grasp, by the aid of all the senses, and presenting subjects at once uniting the enjoyments of the imagination and the reason, and gratifying the passion for knowledge and the desire of profit, is now for the first time possible. The various *meters*, the delicate instruments of modern research, the product and realization in art of scientific progress, are now in the hands of every traveller. He reads off their scales the temperature of the air, the earth, and the ocean, the heights of mountains, the quantity of moisture contained in the air, and many similar relations are by their

means accurately ascertained and measured, at every point whither man can penetrate. Governments have rivalled each other in fitting out expeditions for research and exploration; and if the cultivation of the sciences under the direct patronage of our own, notwithstanding such precedents, be questioned, as on another long vexed subject, we may suppose that the popular voice will incline to advance this cause, whenever it can be done in an incidental way.

The valuable volume of "Sailing Directions, by Lieutenant Maury," is but among the first fruits of what we may reasonably expect from the patriotic and liberal character of the officers of the navy and army. The younger officers are now as a class, admirably qualified, by their tastes and education, to second any system of scientific observation that may be adopted by the national authority. The Coast Survey and the Naval Observatory were the first steps made in this direction by the government, and they have already well repaid all that has been laid out in their maintenance and prosecution. The equipment and *materiel* of the Washington Observatory may be inferior to the imperial endowments of Pultowa or Greenwich, but the genius and untiring industry of its, superintendent has already given it a world wide celebrity. When the exacting and ceaseless duties of his station are considered, it is astonishing how he should have accomplished so much for the geography of commerce and navigation, as may be inferred from the articles in the "Sailing Directions," or when he found time for the arrangement and tabulation of the observations contained in thousands of log-books, the results of which gigantic labor we find in the same volume. We propose to look at what has been thus accomplished by Lieutenant Maury for commercial geography, under the three heads: first, the establishment of a regular system of observation, to be carried out by the various national and commercial marines of the world; second, the contributions already made to science by the materials collected under the direction, and arranged by the author; and third, the practical rules and directions which are therein laid down for the guidance of the navigator, with the results already obtained by following them.

These undertakings have received the sanction of the most distinguished physicists of the age, among them the illustrious Humboldt, who, in writing to a friend, (Dr. Flûgal, U. S. Consul at Leipzic,) says,—

"I beg you to express to Lieut. Maury, the author of the beautiful charts of the winds and currents, prepared with so much care and profound learning, my hearty gratitude and esteem. It is a great undertaking, equally important to the practical navigator, and for the advance of meteorology in general. It has been viewed in this light in Germany, by all

persons who have a taste for physical geography. In an analogous way, anything of isothermal countries, (countries of equal annual thermal temperature,) has for the first time, become really fruitful. Since Dove has taught us the isotherms of the several months chiefly on the land—since two-thirds of the atmosphere rests upon the sea—Maury's work is so much the more welcome and valuable; because it includes at the same time, the oceanic currents, the course of the winds, and the temperature."

It is comparatively easy to map out the course of rivers over the land, and follow them from the glacier of the mountains to the ocean estuary, through their channels. This is but the visible half of the ceaseless circle which the waters make over the land. A far more difficult task it is, to track the viewless winds, and weigh the watery freights they carry from the ocean, and lay down so lowly and gradually in the fog, the dew, the shower, and the noiseless snow; or to pursue the oceanic currents that feed these thefts of the winds, and map out their path—

Parietibus textum cæcis iter.

The solution of the grand problems of physical science connected with navigation do not rest there; they overflow to other branches of human labor and interest. Agriculture, and the health and happiness of mankind, are blended with the course of the winds and the distribution of heat and moisture. The farmer as well as as the mariner, looks up and watches the appearance of the heavens; and plentiful crops and prosperous voyages equally depend on the agencies which set in motion the winds, and uplift the clouds from the ocean. The beauty and impressiveness of these signs, in which Nature addresses Man, render them worthy of the poet. Happy he who can read them aright.

The Language of Nature.—"The wind and rain, the vapor and the cloud, the tide, the current, the saltness, and depth, and temperature, and color of the sea, the shade of the sky, the temperature of the air, the tint and shape of the clouds, the height of the tree on the shore, the size of the leaves, the brilliancy of the flowers—each and all may be regarded as the exponent of certain physical combinations, and therefore, as the expression in which Nature chooses to announce her own meaning; or, if we please, as the language in which she writes down the operation of her own laws. To understand that language, and to interpret aright those laws, is the object of the undertaking which those who co-operate with me have in hand. No fact gathered in such a field as this, therefore, can come amiss to those who tread the walks of inductive philosophy; for in the

hand-book of Nature, every such fact is a syllable; and it is by patiently collecting fact after fact, and by joining together syllable after syllable, that we may finally seek to read aright from the great volume, which the mariner at sea, and the philosopher on the mountain, see spread out before them.

Among the friends and collaborators of Lieut. Maury may be mentioned Dr. Buist, a distinguished *savant* of India, who announces, in the transactions of the Bombay Geographical Society, that the Assistant-Secretary, Mr. Macfarlane, "has made considerable progress in the construction of wind and current charts, founded on the information supplied by ships' logs, and on the principle of Lieut. Maury." What has been done for the Indian and the Northern Atlantic Ocean reveals the value of concert of observation among the navigators and meteorologists of the world. In a letter to Lieut. Maury, dated 17th November, 1851, Dr. Buist, after alluding to a vast mass of facts collected by observers in the Indian seas, observes:—

"Three years since, I began to perceive that we had certain classes of storms that occurred periodically, not only all over India, but all over the region to which my information extended, and that these were synchronous, or nearly so. I then began a series of maps, illustrative of the matter."

A system of stations and the co-operation of navigators is naturally suggested by what has already been done. It must be seen that a true science of meteorology is impossible from local observations. We may watch the height of the barometer, and record the amount of moisture in the air, set rain gauges for ever, and yet be merely accumulating facts that in themselves have no significance. The relations of the river, the rain, and the ocean, are not local; they belong to universal geography, and are, literally,

"General, as the casing air,"

the atmosphere which forms the invisible link in the mighty orbit of the waters about the earth. Nature herself seems here to refuse to be evoked by the efforts of the individual mind, and demands for the revelation of her secrets to be everywhere watched.

Towards the end of the year 1851, the idea of a conference between the meteorologists of Russia and those of the United States was suggested by Kupffer, a laborious meteorologist of the former country; and about the same time a proposition was made by the British Government that that of the United States should co-operate in making these observations at certain foreign stations, and according to instructions prepared by General Burgoyne, Inspector-General of Fortifications. This was felt to

be an auspicious moment to secure concert of action among meteorologists on shore, and co-operation among navigators at sea everywhere; and Lieut. Maury then, in reply to the British proposition, suggested that sea and land should be included as the field, and that a general conference of meteorologists and navigators should be held to discuss the plans, draw up the forms, fix the standards, and select the instruments to be employed on this grand field of research.

A UNIVERSAL SYSTEM OF OBSERVATIONS.—The basis originally proposed by the British Government to that of the United States, is contained in the instructions drawn up by order of the Inspector-General of Fortifications, Sir John Burgoyne, the circular letter of Lord Palmerston to British consuls, and that of Lord Glenelg to Colonial Governors. Nineteen principal stations in the colonies of Great Britain were selected as the points of regular record. These were to be supplied with sets of instruments of similar construction. Twenty sets were to be sent to India, by the Board of Directors of the East India Company, and provision made of the same character for observations at Ascension, Rio de Janeiro, Callao and Valparaiso.

The circular addressed to the officers of the government of India, desires them—

"Upon the occurrence of any hurricane, gale, or other storm of more violence than usual, to note accurately the time of its commencement, the direction from which the wind first blows, whether in gusts or regular, and whether accompanied with rain, thunder and lightning, or other phenomena. Also, to note, with as much accuracy as possible, the changes of direction in the wind, and the time of occurrence of each; and lastly, the duration of the gale, and in what quarter the wind is when it ceases. The variations of the thermometer and barometer at each period noticed will also be of importance, if the means are forthcoming of making such observations."

On the transmission of these instructions to the United States government for the purpose of securing its co-operation in the plan, Lieut. Maury brought forward as an amendment a system of universal observation on sea as well as on land, and securing the assistance of the commercial marines of the civilized nations of the earth in carrying out its details. We copy the following from the paper of Lieut. Maury, on this subject:

"The importance of concert among meteorologists all over the world, and of co-operation between the observer on the shore and the navigator at sea, so that any meteorological phenomenon may be traced throughout its cycle both by sea and land, is too obvious for illustration, too palpable to be made plainer by argument; and, therefore, the proposition for a general conference to arrange the details of such a comprehensive

system of observations, addresses itself to every friend of science and lover of the useful in all countries.

"The domain of this science of the atmosphere: its boundaries embrace the land and cover the sea. To comprehend the laws which govern the movements of a machine so vast as it is, requires that its operations should be observed in all its parts and watched from all points at the same time. Its motions are freer and less obstructed over the water, than they are by the land and across the mountains. Indeed, the ocean itself may, in one sense, be regarded as a grand expression of meteorological agencies; therefore the good-will and friendly co-operation of private ship-owners and masters, in all maritime countries, is considered of great importance to the cause in hand."

The proposition for a universal system of observation, as suggested by Lieutenant Maury, was soon after submitted to the Royal Society, and, so far as an extension of these to the sea is concerned, it received a warm approval. The report adopted by the society recommends that instructions similar to those given to American shipmasters, according to the scheme submitted by Lieutenant Maury to the Bureau of Ordnance and Hydrography in 1842, be given "to every ship that sails" from British ports, with a request to transmit the results of them to the Hydrographer's Office of the Admiralty. The labors of the two greatest naval and commercial nations of the world, it is hoped, may be thus united in promoting the interest of navigation.

The additions that have been made to geographical science since American shipmasters have been engaged, under the guidance of Lieutenant Maury, in the business of watching and recording the course of the winds, the clouds, and the currents, have not been few or unimportant. The power of such discoveries in changing the course of trade is well illustrated by the influence of the Gulf Stream on the trade of Charleston. During the colonial times, the course of trade was to make that port the half-way house for vessels bound from England to the northern ports. If driven off the coast during the winter by gales and snow storms, they returned to Charleston, and there remained until spring. When Dr. Franklin taught the mariner to know when he crossed the banks of this ocean river, by dipping a thermometer into the water, it was, to use the graphic words of the navigators, as if blue and red lines were drawn on the ocean. This discovery shortened the passage to the west from sixty to thirty days. It changed the course of trade. Vessels, instead of running to Charleston to avoid a snow-storm, now stood off for a few hours, thawed out the ship and her crew in the warmth of the Gulf, and were ready for another attempt to make their port.

The view of the general circulation in the atmosphere, as traced by the investigations of Lieutenant Maury, is of the highest interest. The trade winds of the tropical seas have long been known, and form two links in the circuit of the winds around the earth. The ocean scenery of the region of the trades is among the most beautiful to the thoughts and the senses that can be conceived. The machinery of nature aiding so palpably the objects of man, and uniting lands divided so widely by the ocean; the canopy of flying clouds; the fresh and exhilarating breeze blowing day and night in one direction; the charming temperature and the moderate swell of the waves, make it the elysium of the mariner. The gentle spirit of the earth seems to be there bodily present; and the picture of a fleet hanging in the clouds, always an impressive object, becomes exquisitely poetic in its associations, when—

> They on the trading flood,
> Through the wide Ethiopian to the Cape,
> Ply stemming nightly towards the pole.

These trade winds are the great evaporating winds of the ocean; and, as we learn from the investigations of Lieutenant Maury, the belt of the S. E. trades in the South Atlantic is not only more extensive than the N. E. trades in the South Atlantic, but the winds themselves are fresher in the south. The very natural conclusion is, that the increased water thus taken up goes to feed in part the rivers of the northern hemisphere. At the equator these surface winds meet, and form a belt of calms, a node of upward winds, the northeast trade wind becoming a northwest upper current, and the southeast trade a southwest wind in the upper regions of the atmosphere overlying the north torrid zone. At the tropics, two other nodes of calms and of downward currents are met, with the two descending nodes of the orbit of the winds. The prevailing surface winds should now blow in spirals from the southwest towards the north pole, and in similar spirals from the northwest towards the south pole. At the poles the upward current produces another region of calms, whence the winds begin from north and south other revolutions towards the equator. And this system of winds is the source of

The Rains.—"To evaporate water enough annually from the ocean to cover the earth, on the average, five feet deep, with rain; to transport it from one zone to another, and to precipitate it in the right places, at suitable times, and in the proportions due, is the office of the grand atmospherical machine. This water is evaporated principally from the torrid zone. Supposing it all to come thence, we shall have, encircling the earth, a belt of ocean 3,000 miles in breadth, from which this atmosphere

evaporates a layer of water annually 16 feet in depth. And to hoist up as high as the clouds, and lower down again, all the water in a lake 16 feet deep, and 3,000 miles broad, and 24,000 long, is the yearly businesss of this invisible machinery. What a powerful engine is the atmosphere!

"In some parts of the earth the precipitation is greater than the evaporation; thus, the amount of water borne down by every river that runs into the sea may be considered as the excess of the precipitation over the evaporation that takes place in the valley drained by that river. In other parts of the earth the evaporation and precipitation are exactly equal, as in those inland basins such as that in which the city of Mexico, Lake Titicaca, the Caspian Sea, etc., etc., are situated; which basins have no ocean drainage. If more rain fell in the valley of the Caspian than is evaporated from it, that sea would finally get full and overflow the whole of that great basin. If less fell than is evaporated from it again, then that sea, in the course of time, would dry up, and plants and animals would all perish there for the want of water. In the sheets of water which we find distributed over that and every other inhabitable inland basin, we see reservoirs or evaporating surfaces just sufficient for the supply of that degree of moisture which is best adapted to the well-being of the plants and animals that people such basins. In other parts of the earth still, we find places, as the Desert of Sahara, in which neither evaporation nor precipitation takes place, and in which we find neither plant nor animal.

"In contemplating the system of terrestrial adaptations, these researches have taught me to regard the great deserts of the earth as the astronomer does the counterpoises to his telescope —though they be mere dead weights, they are, nevertheless, necessary to make the balance complete, the adjustments of this machine perfect. These counterpoises give ease to the motions, stability to the performance, and accuracy to the workings of the instrument. They are *compensations*."

A strong corroboration of the hypothesis that the south-eastern trades are deflected into the upper regions of the atmosphere, is the fact that the occasional showers of dust to be met with in the Atlantic not far from the belt of calms of Cancer, and in the neighborhood of the Cape de Verd Islands, and sometimes extending to the northern coasts of the Mediterranean, contain the remains of infusoria, whose habitat is not Africa, but South America, and the southeast trade-wind region of South America. These remains cause the red fogs and sea-dust of the North Atlantic, the Cape de Verd Islands, and the dust-winds of southwestern Europe.

THE EQUATORIAL CLOUD-RING.—The graphic essay on the above subject, by Lieut. Maury, is well known; it forms part of

his theory of the circulation of the atmosphere, and the following is his explanation of its formation:

"In a clear day at the equator, this cloud-ring having slid to the north or south with the calm belt, the rays of the sun pour down upon the crust of the earth, and raise its temperature to a scorching heat. The atmosphere dances above it, and the air is seen trembling in ascending and descending columns with busy eagerness to conduct the heat off, and deliver it to the regions aloft, where it is required to give momentum to the air in its general channels of circulation. The dry season continues; the sun is vertical; and finally the earth becomes parched and dry; the heat accumulates faster than the air can carry it away; the plants begin to wither, and the animals to perish. Then comes the mitigating cloud-ring. The burning rays of the sun are intercepted by it. The place for the absorption and reflection, and the delivery to the atmosphere of the solar heat, is changed; it is transferred from the upper surface of the earth to the upper surface of the clouds.

"Radiation from the land and the sea below the cloud-belt is thus interrupted, and the excess of heat in the earth is delivered to the air, and by absorption carried up to the clouds, and there delivered to their vapors to prevent excess of precipitation.

"In the meantime, the trade winds north and south are pouring into this cloud-covered receiver, as the calm and rain-belt of the equator may be called, fresh supplies in the shape of ceaseless volumes of heated hair loaded to saturation with vapor, which has to rise above and get clear of the clouds before it can commence the process of cooling by radiation. In the meantime, also, the vapors which the trade winds bring from the north and the south, expanding and growing cooler as they ascend, are being condensed on the lower side of the cloud stratum, and their latent heat is set free to check precipitation and prevent a flood.

"While this process and these operations are going on on the nether side of the cloud-ring, one not less important is going on on the upper side. There, from sunrise to sunset, the rays of the sun are pouring down without intermission. Every day, and all day long, they operate with ceaseless activity upon the upper surface of the cloud stratum. When they become too powerful, and convey more heat to the cloud vapors than the cloud vapors can reflect and give off to the air above them, then with a beautiful elasticity of character, the clouds absorb the surplus heat. They melt away, become invisible, and retain, in a latent and harmless state, until it is wanted at some other place and on some other occasion, the heat thus imparted."

THE GEOLOGICAL AGENCY OF THE WINDS.—The geological relations between the wind, the land, and the water, are shown

to have an intimate connection with the fertility and habitable quality of each region. The largest portion of the surface swept by the southeastern trades is water; but those regions which lie to the northeast of South America and Africa, in the northern hemisphere, are deserts, and were it not for the inland seas of Europe and Asia, these regions would be still more extensive. In like manner, Australia occupies in the southern hemisphere a position opposite to the continent of Asia, and, being swept by winds borne over a vast extent of land, while in contact with the surface, is found to be mostly a desert. If this contental mass were removed so as to occupy the space in the South Pacific swept by the southeast trades, which blow as southwest winds over the basins of the great rivers and lakes of North America, the channel of the Mississippi would resemble that of the Australian rivers, and present a dry and dusty trough in the midst of a desert, the great lakes would be drained, and Niagara no longer resound with the whirl of its world of waters. If ever there was a time when the Andes and the Continent of South America were submerged, then the ancient winds that fell on the region of Central Asia, and the basins of the Caspian and Aral, were swelled with the waters that now are discharged, in part, by the Amazon and Orinoco into the ocean, and those seas were united, forming a Mediterranean of vast extent, and probably discharging its waters by an estuary more magnificent than the St. Lawrence. According to the circulatory scheme of the atmosphere, the winds that play over the torrid zone of one hemisphere become the surface winds of the temperate zone of the other hemisphere. Fill up the south torrid zone, the region of the southeast trades, with land, and the north temperate zone would become one vast Sahara. Such, in brief, is the aspect of the dry season in the geological cycle, happily not co-existing with man's possession of the planet.

"The Saltness of the Sea," is the title of another of the series of interesting papers contained in the present volume. We are unable to do more than to state that it is to this quality, in connection with the evaporation caused by heat and the passage of the winds over the water, that the currents of the ocean owe their extent and depth. By these agencies, a general circulation of the waters of the sea is maintained; and so complete is it, that the per centage of its salt is found to be nearly the same in every part of the globe.

Following the discussion of a general circulation of the waters through the entire ocean, is the argument so intimately connected with it, and now so deeply interesting both to philanthrophy and science, that a permanently open sea exists in the Arctic basin. The study of the currents of the ocean have led Lieut. Maury strongly to the conclusion, that the pole is sur-

rounded by this sea instead of being piled by everlasting barriers of thick-ribbed ice. The report of Lieut. De Haven, the commander of the Grinnell Expedition, the first of the noble enterprises set on foot from the United States to aid in the discovery and rescue of the lost ships of Sir John Franklin, follows; and in the midst of the dangers of the dreary cruise during the long nights of those two polar winters, a ray of hope, faint though it be, hangs over the track of the intrepid Kane, who has dared again the perils of the Arctic Sea, at the joint command of humanity and national glory.

Deep Sea Soundings.—To determine the depth of the ocean, and approximately the outline of its abysses and shallows, will furnish data of the utmost value in completing the theory of the tides. We believe that American officers have been the foremost, and, with a few exceptions, the only investigators in this problem. Already they have contributed euough to make out a chart of the bottom of the Atlantic, which gives a general idea of the slopes and hollows of that ocean valley, and its transverse branches, the Caribbean Sea and the Gulf of Mexico. The first cruise of the "Fanny," the schooner despatched on this service of making these explorations, cleared up all doubts as to the non-existence of certain fancied rocks and shoals which had been long enough bugbears to navigators. The following is the list of rocks found to be purely imaginary during the cruise.

	Latitude North.		Longitude West.	
Ashton Rock	33°	50′	71°	40′
False Bermudas	32	30	58	40
Nye's Rock	31	15	55	50
Van Keulen's Vigia	31	40	38	20
Joryna Rock	31	40	23	45
Steen Ground	32	30	21	15
Mary's Rock	19	45	20	45

Lieut. Berryman, in the United States brig "Dolphin," reports, in 1853, that nothing has been found at the places indicated:

	Latitude North.		Longitude West.	
Eight Stones	34°	22′	16°	40′
Jean Hammond's Rock	36	56	19	50
Haugault's Rock	40	58	48	40
Daraile's Rock	40	52	54	42
Haugault's Breakers	41	7	49	23
35 Fathom Shoal	42	32	45	17
—— Rock	30	50	27	19

At some of these localities soundings were taken, with depths of from 2,200 to 4,600 fathoms. The greatest depth sounded in the Taney was in latitude 31° 59′ north, long. 58° 43′ west, on the 15th November, 1849, when 5,700 fathoms of wire were let out without reaching the bottom. The form of the deepest portion of the North Atlantic is that of a *y*, lying northwest and southeast,

the two divisions being in the former direction, and stretching from 20° to 40° north latitude, and from 40° to 60° west long. Just on the verge of one of the divisions of the *y*, the Bermudas rise from the sea, forming apparently a peak mostly submerged, of nearly six miles in height. The *y* form is preserved in the next higher shelf of the bottom, only the tail is prolonged, forming a long trough between the two continents of South America and Africa. Two lines of soundings have recently been run across the Atlantic by Lieut. Berryman, in the Dolphin; they confirm the supposition, that the depth of the North Atlantic is nowhere greater than 5,000 fathoms. No little practical difficulty is experienced in sounding these depths, and the best check, in fact it is indispensable, to observe the rate at which the wire or twine is delivered from the reel. Without this precaution, currents and counter-currents may operate on the line long after the plummet is on the bottom. The following is a series of deep sea soundings recently made from the brig Dolphin, Lieut. O. H. Berryman, and extracted from a letter of our author. It will be seen that it exhibits the profile of two lines carried across the North Atlantic.

DEPTHS OF THE OCEAN.

Date.	Lat. N. D. M. S.	Long. W. D. M. S.	Depth in Fathoms.	
Oct. 4, 1852	39 39 00	70 30 00	1,000	no bottom.
" 7 "	41 12 00	62 38 00	2,200	bottom.
" 9 "	41 40 00	59 23 00	2,600	"
" 10 "	41 40 00	56 01 00	2,595	"
" 11 "	40 36 00	54 18 30	3,450	"
" 20 "	41 07 00	49 23 15	4,580	"
" 24 "	43 40 00	42 55 00	2,700	"
" 25 "	44 41 07	40 16 00	1,800	"
" 26 "	33 08 00	16 10 00	2,950	no bottom.
Jan. 3, 1853	34 15 00	16 45 00	2,298	bottom.
" 9 "	36 49 00	19 53 45	2,950	"
" 9 "	36 59 00	19 58 00	2,500	"
" 29 "	30 49 00	27 25 00	2,200	no bottom.
" 30 "	30 45 00	27 31 00	2,480	bottom.
Feb. 3 "	27 05 00	28 20 26	1,700	"
" 4 "	29 21 00	30 48 00	2,580	"
" 5 "	31 17 00	33 08 00	2,400	"
" 6 "	28 55 00	35 49 00	1.800	no bottom.
" 8 "	29 13 30	41 20 50	2,270	bottom.
" 9 "	31 16 00	43 28 00	2,089	"
" 10 "	33 01 00	44 31 00	2,250	"
" 11 "	32 29 00	47 02 00	1,950	no bottom.
" 12 "	32 55 00	47 58 00	6,600	doubtful.
" 13 "	33 03 00	48 36 00	3,550	bottom,
" 15 "	32 47 00	50 00 00	3,240	no bottom.
" 20 "	28 59 00	57 51 00	1,380	bottom.
" 22 "	28 20 00	59 44 00	2,900	doubtful.
" 23 "	28 04 00	61 44 00	3,000	bottom.
" 24 "	28 23 00	64 17 00	2,518	"
" 25 "	27 42 36	66 11 15	1,000	no bottom.
" 26 "	26 49 00	66 54 00	2,720	bottom.
" 28 "	28 16 00	69 24 00	2,950	"

THE CHARTS.—A series of charts has been compiled from the observations made by the numerous intelligent navigators engaged in the scientific enterprise set on foot by Lieut. Maury. The pilot chart is derived from these results. The ocean is divided into square districts, of five degrees in length on each side. The winds for each month in each district are then collated, and it is hence easy, knowing the prevailing set of the winds for each month, to decide upon the probability of finding in each district a favorable wind. The problem then assimilates to that of the engineer who is called on to make detours to avoid mountain masses in fixing on the best line for a road on land.

The thermal charts are of no little scientific import, and from them we learn the office of the ocean in ameliorating the climates of the earth.

The chart of the trade-winds embodies the results of the observations made on these winds. One remarkable discovery has been made, and it is that the southeast trade region is wider than that of the northeastern trade in both oceans. The average line of division is about 9° north of the equator.

OCEAN TELEGRAPH.—The soundings reported in the preceding table establishes, beyond doubt, the practicability of laying a submarine electric cable on the bottom of the ocean.—ED.

THE ELECTRIC TELEGRAPH.

SPEAK the word, and think the thought,
Quick 'tis as with lightning caught,
Over—under—lands or seas,
To the far Antipodes.

Now o'er cities throng'd with men,
Forest now or lonely glen ;
Now where busy Commerce broods,
Now in wildest solitudes ;
Now where Christian temples stand,
Now far in Pagan land !

Here again as soon as gone,
Making all the earth as one.
Boston speaks at twelve o'clock,
St. Louis reads ere noon the shock ;
Seems it not a feat sublime—
Intellect hath conquer'd Time !
Sing who will of Orphean lyre
Ours the wonder working wire !

Art. III.—SUBTERRANEAN TELEGRAPH,

AS COMPARED WITH WIRES IN THE AIR.

OWING to the difficulties experienced in working wires on poles, or in the air, on account of atmospheric electricity, the minds of many are, at present, fixed upon a thousand plans to remedy the evils, and among these diversified speculations is a subterranean telegraph. At present we are unwilling to say but little upon the subject, knowing serious objections to any and all modes proposed; and as to that, which is surrounded with the least evil, we are unable to determine, except upon questionable theories.

An English writer thus refers to the subject, although we believe there are some subterranean telegraphs in France.

"It may be said that much of the alleged damage likely to ensue from the action of natural currents of electricity passing through the atmosphere, would be obviated by the use of wires buried in the earth; but when it is found in the case of even a single line of telegraph in Prussia, that more than one hundred miles of wire which were buried in the earth—owing to their defective insulation, and the difficulty experienced, and the time occupied in detecting the exact position of those defects, and in remedying the defects when discovered—have been abandoned, and the wires suspended on posts in their stead, the employment of subterranean wires for the sake *merely* of lessening the effects of atmospheric electricity cannot be recommended.

"And again, when we call to mind the great additional expense that must be incurred at the first outset, and the great difficulty and expense that must be encountered afterwards in submerging *additional wires*, when the increasing wants of trade demand such additions, it would appear unwise, in the present unsatisfactory evidence on the subject, to pursue very extensively the plan of burying the wires in the earth, in preference to their suspension in the air, unless money were of little or no importance, and the best possible insulation was demanded, whatever might be the cost."

We may be too fastidious in our views as to the practicability of a subterranean telegraph; but until there is more evidence upon the subject, and the plan thoroughly tested, we cannot refrain from entertaining a doubt as to the general feasibility, unless at a very great expense, and even then its economy is very questionable in America.

Our lines are very lengthy, and extend over lowlands and uplands, mountains and valleys, plains and swamps, spreading over every species of formation common to the earth. Through many sections of America, the expense of a subterranean system would be very great, and in fact so large, that the prospective income of many, if not all the lines, would never be commensurate with the hopes and wants of investing capitalists.

Extend our commerce to the port of Singapore; laden our ships with the natural products of Borneo, Malacca, and other islands of the Eastern Archipelago; admit them free of duty; open for competition the manufacture of gutta percha insulation; and then, and not until then, need we contemplate the beauties of a Telegraph Line, freed from the annoying hindrances of atmospheric electricity, particularly in the South and West, where Autumn is frequent in the production of the most gorgeous aurora borealis. T. P. S.

GALVANIZED IRON.

We have seen, within the last half century, the most surprising changes in the condition of human affairs, brought about by the scientific application of established principles to practical uses. Not but that noble buildings, and beautiful statuary, and magnificent bridges, remain as monuments of the past; but it was not for antiquity to invent steamboats, or railways, or the Napier press, or the magnetic telegraph, or to equal even in architecture some of the splendid edifices which mark the progress of our age.

Magnetism, supposed to have but one power, and that a directive one,—to have but one practical use, that by which the navigator steers his bark in safety,—is now applied in the reduction of ores, and in the lifting of weights, and the writing of words, and by its ready obedience to a newly-discovered law, becomes the trusty amanuensis of the telegraphic conductor.

Galvanism, allied to electricity and magnetism, having the characteristics of both, with effects dissimilar, has also given its aid, under the direction of science, and we have its singular cements flowing through the vats of the laboratory, to form new *metallic combinations*, and to give strength, *durability*, and beauty to fabrics of indispensable necessity. The galvanic battery arms iron not only with the powers of the magnet, but gives it *security from corrosion*, and thus we have rapidly coming into use, materials with which, but a short time ago, we were entirely unacquainted.

Art. IV.—THE AMERICAN TELEGRAPH CONFEDERATION,

ORGANIZED AT WASHINGTON, MARCH 5TH, 1853—TO ASSEMBLE ANNUALLY—COMPOSED, BY REPRESENTATION, FROM ALL LINES IN NORTH AMERICA USING THE MORSE AMERICAN ELECTRO-MAGNETIC TELEGRAPH.

The origin of this Association was the publication of a call, signed by the Presidents and others of a large number of the Telegraph Lines in the United States, inviting every company using the Morse system, to send one or more representatives to a Convention, to assemble at Washington City, March 5th, 1853. The object of the Convention as thus promulgated, was to act on such matters as might be of interest to the lines in common, without regard to the special interest of any given line or connection.

The Convention assembled, and embraced a representation from lines, amounting in extent to at least three-fourths of the wires in America. Various proceedings took place, and among them the adoption of a resolution, presented by Mr. Alvord of Missouri, organizing a General Committee on Confederation, to act in the interim of the Convention, with general powers. That committee, at an early day, after the adjournment of the Convention, issued the annexed circular address, which we republish for more general reflection. It embraces some very important facts, worthy of the daily consideration of every telegrapher, which too, must sooner or later be an integral on the final adoption of a universality of business system. Finding the business proper for this committee to act upon,—as contemplated by the Convention, too great to receive the necessary attention, the editor of the Companion was selected to act as Secretary, and as soon as possible, resigned his offices in the West to assume the new duties at Washington City, under the official direction of the committee appointed by the Convention as aforesaid.

The circular address of the Secretary, following that of the committee, will evidently startle the minds of every telegraph management throughout the country, and at the same time infuse a cheerful spirit, and new hope for success, in the prospect of realizing the immense saving, so emphatically exhibited by that document. The facts therein promulgated are worthy of immediate attention. The plans proposed ought to be adopted without delay, that the benefits may the earlier be accomplished. [Editor.

ADDRESS

To the Presidents of the several Companies using Morse's American Electro-Magnetic Telegraph, in the United States, Mexico, and the British Colonies in North America.

GENTLEMEN: In obedience to the directions of the Telegraph Convention, recently held in the City of Washington, the undersigned have the honor to transmit a copy of the resolutions adopted by them, and ask the concurrence and future co-operation of your respective companies.

The members of the late Convention, as well as from their observation and experience abroad, as by an interchange of views among themselves, were deeply impressed with the necessity of some organization to preserve harmony, and produce uniformity in the mode of doing business by the many companies using Morse's Telegraph. Obviously, this can be attained only by laying aside, for the occasion, all animosities and jealousies, which may have grown out of competition, or the violation of exclusive privileges, real or supposed, and waiving for that purpose only, but without abandoning, all conflicting claims. Acting upon these principles, the recent Convention was distinguished by the harmony and good feeling which characterized its sittings, giving promise of good to be derived from the annual recurrence of such assemblages.

It is, perhaps, a public misfortune, that all the principal telegraph lines of the country are not subject to one control, governed by one set of rules, and presenting in all cases an undivided responsibility.

As such an arrangement is obviously impracticable, it becomes important to the companies, and to the public, to secure by other arrangements, as far as practicable, the advantages which would result from a controlling power. Many evils have already shown themselves as incident to the present system, among which are the following, viz:—

1. The adoption of different abbreviations and signals on different lines, rendering their language measurably unintelligible to each other. On some lines it has even been proposed to change the elements of which some of the letters of Morse's Alphabet are composed. It requires no argument to prove that the tendencies of these practices is to produce utter confusion in the business of telegraphing; and if allowed to proceed, those engaged in it will become as unintelligible to each other, as were the builders of Babel after the confusion of tongues. This mischief cannot be obviated otherwise than by a concert of ac-

tion among the companies, and the adoption of one general system, setting their faces against any alteration therein, unless it be by common consent. As a basis for all future action, we earnestly recommend the adoption of the seventh and eighth resolutions, herewith transmitted.

2. Perhaps the greatest evil existing under the present system, is the absence of due responsibility on account of messages sent over the lines of two or more companies, which are unreasonably delayed, or never delivered at all. We all know that perfect certainty of prompt delivery is not attainable in the present condition of the telegraph lines generally ; but it is not difficult to adopt and enforce such regulations, as will greatly lessen the disappointment and irritation so prevalent among the customers of the telegraph, in consequence of the failure of their messages to reach their destination, or their inability to procure information as to what has become of them.

The idea so prevalent among operators, that it is an injury to their line to let connecting lines know when they are down, is fatally erroneous. They receive messages and retain them, awaiting the repair of their line ; and when the station whence the message came inquires after them, too frequently no answer is returned. The customer becomes impatient and irritated, and demands the refunding of his money, which is refused ; whereupon he curses the telegraph and ceases to use it. None of us, it is confidently believed, have duly appreciated the injury done to all the telegraph lines by such short-sighted policy.

All this can be readily obviated. Let each line, when down, promptly inform every connecting line of the fact. If there be any other line by which messages appropriately belonging to the line thus down, can be promptly sent, let them be silently received and so forwarded ; if not, let the customer be frankly told that a connecting line over which his messages must pass is down, and that it is uncertain when his message will reach its destination. If thus informed, he chooses to leave his message, he cannot complain of fraud or imposition.

The undersigned are perfectly satisfied, that incomparably more harm arises from the omission to give information in such cases, than from the failures themselves; and that multitudes abandon the use of the telegraph not because their messages have been delayed or lost, but because they can obtain no satisfactory explanation of the cause.

Intimately connected with these practices is the subject of refunding. Customers are put to great inconvenience in obtaining evidence that their messages have been delayed, mutilated, or lost, when the telegraph ought to know all about it. That the station from which the message is sent, is not in possession of the facts when messages are delayed or lost, is the fault of

other stations or connecting lines, in withholding information which ought to be given.

These evils the Convention hope to mitigate by the rules laid down in their second, third, fourth, and fifth resolutions, which are earnestly recommended to the adoption of your respective companies.

To give greater efficiency to the principles therein laid down, the committee recommend that the following explicit instructions be given to the chief operator at the terminal station of every line, viz.:—

1. That when any line ceases to operate in whole or in part, for the space of one hour during ordinary business hours, notice thereof shall be given to all connecting lines, specifying what part of the line, if any, is still in operation; and that when the line again commences to operate, notice thereof be also given immediately to all connecting lines.

2. That operators of connecting lines, receiving such notices, shall immediately send them along their respective lines.

3. That when from any cause a message from another line or station cannot be forwarded, or, if it has reached its destination, cannot be delivered the same day, notice thereof shall be given to the station whence it came.

A strict observance of these rules would remove many causes of irritation which now beset the telegraph business, and would obviate much trouble now experienced in the matter of refunding.

The second resolution purports to regulate the principles on which moneys refunded shall be charged upon the several companies concerned. In the discharge of the duties imposed on the committee by the fourteenth resolution, they recommend the following rules for giving effect to the second resolution, viz:—

1. Where refunding is required by reason of an error of the telegraph, the whole amount shall be chargeable to the company on whose line the error was committed.

2. Where refunding is required by reason of delay in the transmission of a message, the whole amount shall be chargeable to the company on whose line the delay occurred, unless said company shall show that it was occasioned by providential or uncontrollable circumstances, of which the connecting lines were duly informed.

3. Where refunding is required by reason of neglect to deliver a message when received, the whole amount shall be chargeable to the company at whose station the neglect occurred.

4. In all cases where refunding is required, the manager of the station where money was paid in the first instance shall be sole judge of the justice of the demand; and if any dispute

arises as to what line is chargeable with the amount refunded, or any part of it, the question shall be referred to the Presidents or Principal Managers of the lines concerned; and if they disagree, the subject shall be referred by them to the Corresponding Committee, whose decision shall be final. *Provided*, that when any line refuses or omits to give information as prescribed in the third and fourth resolutions, the whole sum refunded shall be charged to such line.

The other resolutions adopted by the Convention do not appear to need any explanation. That uniformity may at once be introduced and preserved, it is recommended that they be all adopted, though they may in some particulars be considered objectionable, and that any desirable modifications be reserved for the next annual Telegraph Convention.

The Committee trust that all Telegraph Companies in North America using Morse's system will cause themselves to be represented in the next Annual Convention, by delegates formally chosen and furnished with credentials, and that they be authorized to pledge the faith of their respective companies to carry into effect the resolves of the Convention, so far as they may relate to the mode of doing business, their intercourse and responsibilities among themselves. It is only by receiving the vote of the Convention as authoritative, that it can become permanently useful.

In conclusion, we beg that, as soon as practicable, you will submit the resolutions of the late Convention, together with the recommendations of this Address, to your Company or Board of Directors, and communicate the result of their action thereon to our Chairman, that we may notify each Company of their adoption or rejection by the rest.

B. B. FRENCH,
AMOS KENDALL,
J. D. CATON,
J. K. MOREHEAD,
WM. M. SWAIN.

CIRULAR ADDRESS

TO ALL ELECTRIC TELEGRAPH COMPANIES IN NORTH AMERICA.

At the late American Telegraph Convention, in Washington City, the following resolution, among many others, was adopted, viz.:

"That it shall be the duty of the Corresponding Committee to encourage the establishment, at some central point, of manufactories or depôts of all the necessary materials, such as acids,

instruments, stationery used and consumed in the conduct and management of telegraph lines."

Not being able themselves to attend to the details necessary to the efficient execution of this and other resolutions adopted by the Convention, the Corresponding Committee, deeming this matter particularly of great importance, appointed the undersigned their Secretary, with the understanding that he was to attend to the details which the Convention had imposed upon them.

Thus authorized by the Committee, the undersigned has given special attention to the subject of the foregoing resolution, which he interprets as follows, viz.:

1st. The organization of a system, by which all the lines in the country can procure the materials needed in the successful management of the Telegraph, *unadulterated* with baser substances.

2d. That the articles purchased might be obtained at the lowest price possible, resulting from a general wholesale arrangement.

3d. That a general uniformity might result therefrom, dispelling the necessity for continual experiments, originating from a scarcity of material in any section of the country, whereby the management necessarily resorts to supposed equivalents.

Considering the objects of the resolution to be as just recited, the Secretary has proceeded to make complete arrangements for carrying the same into immediate operation. He has visited the various cities in the East, and procured the prices from many firms, offering to supply the lines throughout the country with the materials consumed. The prices submitted are greatly under the amounts now paid in all parts of the country, and the proposals accepted are at least twenty-five per cent. less than the lowest price paid by any line heretofore. The multiplication of commissions by the dealers greatly increased the cost of the article, and with a view to save that increase of expenditure, the Secretary has, in every instance, sought proposals from the manufacturers. The great saving will be readily seen by an examination of the figures presented hereinafter. Not only is the price reduced, but the pure article is obtained, unadulterated and free from mixture with inferior qualities.

It must be remembered, too, that the great saving accruing under this arrangement, as well as the perfection of the materials purchased, contemplates the concentration of purchase through the arrangement of the American Telegraph Confederation. Some of the companies will not realize much saving, because their consumption is small. Every line throughout the country greatly needs the economy proposed, though ever so little. The benefits will be mutually enjoyed; none are excluded. The

arrangements contemplate, that ever company or every line throughout the United States, Canadas, Nova Scotia or Mexico, can partake in the advantages proposed. It is the interest of all to unite; the larger the purchase, the less will be the sum to be paid; thus all will partake alike in the economy. The invitation is to all, and the earlier commenced the better. Many lines have, very probably, a supply on hand sufficient for the season, but when new orders are given, it is hoped the proposals beneath submitted will be accepted. The prices embraced in the schedule may not be much less than now paid by some lines, but much less than paid by other lines; besides, a good article is procured for the same amount paid for an inferior. Some lines are paying three hundred per cent. more than proposed in the schedule, and the consumption very large; to these lines the saving will be extraordinary. An examination of the prices will prove to be one-fourth, in the aggregate, less than the lowest price paid by any line in America. This may seem to be a bold assertion, but nevertheless it is true. The prices paid by the various lines have been procured, and there can be no mistake as to the correctness of the statements submitted.

It is proper to add, here, that a moderate commission is added to the price specified in the schedule, to be appropriated by the General Committee to defray the expenses necessary in carrying out the directions of the Annual Conventions. If the revenue thus accruing exceed the necessities of the Committee, a reduction will of course be promptly made. The Committee, under the resolutions of the Convention, will manage or direct the course of procedure in all matters, and will not fail to do all that may be possible for the general prosperity. The companies can safely repose confidence in the arrangements presented, as there are those entrusted with the charge, who will realize the advantages of the economy as shareholders in the respective lines, and not otherwise. The Committee is elected annually, and the Convention can adopt such rules and regulations as to its powers as may be deemed requisite and necessary. The prosperity of the cause is the aim in view. That the subject may the better be understood, a short review of the cost now paid and as proposed will doubtless suffice.

NITRIC ACID.

This article is one of the most costly in telegraph consumption, and none more impure as in general use; it is one of the important elements connected with the enterprise, and should be carefully considered, that the very best quality may be obtained for the objects in view. There are but few gentlemen connected with telegraphing who are expert chemists, and in consequence of which, the most base and adulterated ingredients

have been mixed with acids and used in batteries instead of the quality required in the generation of effective electrical action. In fact, the most injurious effects have resulted from the use of mixed acids. Nitric acid is often diluted with muriatic and sulphuric acids, or, as commercially known, oil of vitriol. These baser acids reduce the cost of nitric in proportion to the ratio of mixture, and its utility is reduced upon the same scale. Muriatic acid acts powerfully upon zinc and platinum. According to the best authorities, it is much employed for making many metallic solutions; and in combination with nitric acid, it forms the *aqua regia* of the alchemists, so called from its property of dissolving gold, &c.

The mixture of acids does not only impose upon the lines a higher price for an inferior quality, but it brings into use agents powerful in decomposing the metals, and consequently shortens their duration in usefulness. The chemical action of the battery is a hundred-fold greater than the electrical. It should only be commensurate therewith. Science has settled the fact, that muriatic acid is not an auxiliary in the Grove battery. No one seeks it, but it is often forced upon the lines without their knowledge of the fact. Relative to the mixture of sulphuric acid, or oil of vitriol, with nitric acid, it may be said that there is no harm done, or that the two acids are used in the Grove series. That is true, but look at the relative value. Sulphuric is worth only one-fourth the value of nitric. Why then pay the price of the former for the latter? If they have to be mixed, let it be done at the offices, and let each kind be purchased at its proper value.

During the investigation of the quality of acids, by the Secretary, gentlemen proposed to furnish acids at most any price. In the West and South, the scale of acid mostly usd was No. 44, and anything under that was deemed worthless. In the East nearly as erroneous ideas prevailed. In fact, there are as many views entertained as to the kind or quality of acids as there are persons in the management of telegraph lines.

In procuring bids to furnish the acids, under this arrangement, the question proposed was, "At what price will you furnish nitric acid 44° Baumee's Hydrometer?" A druggist responded, "Nine cents." The question was then asked, "Are you willing to submit that acid to an expert chemist for examination?" He answered, "No," but was willing to test it with the acid used by nearly all the telegraph lines in the country, and it should be equal in quality.

He said that the lines generally required an acid that would act readily on the zincs; and a mixture of muriatic acid was the best means of accommodating the managers, as they pronounced it the quality required. A mixture with sulphuric acid or oil of

vitriol elevates the scale of specific gravity, and therefore its measurement need not be feared by the dealer. Such are the means resorted to, by commercial trade, to gratify the singular ideas advanced by communities not expert in the science of chemistry. At least three-fourths of the acids heretofore used in the United States by the telegraph lines, are adulterated at least ten per cent., and thus the injury may be estimated proportionate with the scale of base mixture.

Consultation with practical telegraphers, and calculations based upon reliable data, show the quantity of nitric acid used in America to be about 32 carboys of 120 lbs. per week. The prices paid range from 9 to 15 cts. per lb., the average being 12 cts. per lb. This would make an estimated annual cost for nitric acid $23,961 60. The Secretary can have the quality of acid used by the lines unadulterated for 8½ cts. per lb., which would amount to an annual outlay, based upon the quantity estimated above, of $15,972 80. This makes a saving of $6,988 80 per annum! The saving will greatly exceed this, because several hundred offices have been and are now paying as high as 30 cts. per lb. for an inferior article to that offered now for 8½ cts.

The carboys are to be well made, strong, and capable of standing the hardships of transportation. They will be marked, and known as telegraph acids. The world generally entertains a great fear of the combustion of *aqua fortis* in transportation, and shippers manifest great indifference as to forwarding it. The acid will be shipped under an independent name.

SULPHURIC ACID.

The telegraph lines do not use the proportionate quantity of sulphuric acid contemplated by science and the early projectors of telegraphing. The cause of this inequality is owing to mistaken views entertained, mostly by young gentlemen, who have not a thorough knowledge of the necessary ingredients in the proper composition of a battery. Many use nitric acid diluted with water, in which to immerse the zincs, rather than be troubled with pouring out acids from separate carboys. By this process an acid costing 8½ cts. is used instead of one costing 2 cts.; in this, economy will be promoted by its abolition, and the restoration of principles settled by science and practice for years. Some gentlemen do not use any acid diluted with water, and claim it as a grand discovery in economy. Experience has taught that in such cases, the battery has to be enlarged, and it is inactive for more than an hour after its construction. Time has to be allowed for the acid to ooze through the porous cups, and a chemical action on the zincs is produced. A battery thus constructed will always be black, and more or less covered with a thick coating of the oxide of zinc. Sulphuric acid cleanses the

zincs, and an opportunity is given for an even and steady action of the nitric acid upon the metal.

Science has devised the construction of the Grove battery. Experience has demonstrated its correctness. There should be two liquids, and two metals—one liquid to be nitric acid, and the other dilute sulphuric acid; and the metals platinum and amalgamated zinc. The plates of platinum are immersed in the nitric acid, and the zinc in the dilute sulphuric acid.

Rain water is the best with which to dilute sulphuric acid.

The quantity of sulphuric acid that should be used in America, for batteries as estimated under the head of Nitric Acid, would be about 50,000 lbs. per annum, which, at 2 cts. per lb., would amount to $1,000; the equivalents now used costing from 4 cts. to 10 cts. per lb., amounting to at least $2,500 per annum. In this, the result of arrangements made by the Secretary, the lines will make a saving of at least $1,500.

ZINCS.

To relate the many tricks resorted to in the manufacture of telegraph zincs, would require many pages. The impositions exceed those related of acids. Thousands of zincs used by the telegraph lines are composed of zinc, lead, tin-solder, and even iron, and every kind of base alloy. The commercial rates of zinc at present, in New-York, are quoted at 7½ to 8 cts. per lb. On examination of the rates quoted in different cities, it cannot be bought for less. How, then, can lines purchase a pure article for a less sum, after the expenses of moulding? There is no possibility for such to be the case; if bought for less, it must be alloyed. It is true that zinc rates very high at present, and the price is expected to be less in a few months. A proposal has been presented and accepted to supply zinc cups, warranted free from alloy, at 8 cts. per lb. This very favorable offer contemplates, like all other proposals, the patronage of the entire enterprise.

A few estimates will show the necessity of care in the purchase of zinc.

The quantity in daily use is about 1,100. These zincs, moulded of proper weight, will last, on an average, about two months. The locals will wear out in less time. The main battery, if properly amalgamated, will serve longer. According to this basis of calculation, the quantity consumed per annum will be 6,600, which, at 8 cts. per lb., would amount to $1,320. The lines have been paying all prices, ranging as high as 15 cts. per lb. At this price, full 8,000 miles of lines are paying at this time, and purchasing with them at least 20 per cent. of alloy. Estimating the average price paid to be 12 cents. per lb., the cost, as per quantity consumed, would be for 16,500 lbs. = $1,980, or $660 nett gain. These items are less than the calculations of others who have been consulted upon the subject. They are fully

sustained by the reports of the various companies. At the price proposed, a pure metal is obtained, having passed through the analytical examination of a competent chemist. There will be no compounding of base metals, causing a torpid battery, but the pure and unalloyed material will be procured. The great result will not only be in saving of original outlay, but in securing a battery promoting the ends in view.

QUICKSILVER.

When Mr. Sturgeon and Mr. Kemp discovered the application of mercury by rubbing it on the zincs, causing them to last much longer, and the flow of electricity during the action of the battery to be more constant and regular, the scientific world rejoiced in the prospect of economy. Unfortunately, this saving is totally disregarded by many offices. This is, doubtless, the result of indifference and want of proper energy. The great benefits resulting from the amalgamation of zincs, ought to stimulate every operator to give the batteries the greatest attention in its fulfilment. The cost of the quicksilver is greatly less than the waste of zinc and acids by its non-use. It equalizes the chemical and electrical actions. The two harmonize, and the result is most effective. There is as much fraud or imposition in the sale of quicksilver as there is connected with the other items heretofore mentioned, and the telegraph lines seem to suffer the most. That which has been used by many lines is alloyed with lead, tin-foil, &c. Lead is worth 5 cts. per lb., and its mixture with quicksilver will enable the vendor to sell the lead at the rate of $1 per lb., that being the average price paid throughout the country. Those who have any doubt as to the correctness of this statement, can easily test its truthfulness by immersing a thin piece of lead or tin-foil in some quicksilver, and in a few moments the lead or tin will be dissolved, and appear as legitimate mercury. The alloy can exceed twenty per cent. and pass as genuine with many purchasers. Our lines have been cheated out of thousands of dollars by the mixture of these baser metals with quicksilver. The price paid heretofore, has been from 75 cts. to $2 per lb., mostly exceeding $1 per lb. The quantity used in America per annum, including mercury connections, is about 3,000 lbs., which at $1 per lb., would be $3,000, and at 65 cts. $1,950, or a saving of $1,050.

It will be seen from these figures that there will not only be a great saving in procuring a pure article, but also in the cost of purchase.

POROUS CUPS.

This article can be supplied to the lines at 62 cts. per dozen, made from the best New-Jersey clay. This clay is con-

sidered the best for porous cups that has been discovered in America, and an inferior quality will not answer as well. The best is the cheapest in the end. An inferior article made from brick clay can be purchased at 50 cts. per dozen. No arrangement has been made for purchasing such an article, they being deemed injurious to the proper construction of a battery.

TUMBLERS.

Various are the kinds of tumblers in use. Some thick and some thin, some costing $1.65 and some $2.50 per dozen. Some are so thin that they can scarcely bear the weight of the zinc and acids. In cold weather they easily break, thus causing a great expense. Tumblers can be furnished the lines at $2,00 per dozen, made of the best glass, and sufficiently strong for substantial use, and economical management. An inferior quality can be purchased at $1,60. No arrangement has been made for purchasing an inferior quality. The tumblers, zincs, and porous cups are all made to suit as pairs, and the full force of the battery will be brought into action by such an arrangement. A large zinc in a small tumbler occasions the use of a small quantity of dilute sulphuric acid, and its renewal must be more frequent. These questions will be carefully considered.

PLATINUM.

A line once supplied with a good article of platina, will not be required to renew the supply. If alloyed with inferior metal, it will not endure the nitric acid. If rolled into thin slips, the breakage is very great. If long and thick, the wear will be longer. There are various views entertained as to the utility of the thin or thick strip. Orders will be complied with. If thin be desired, it should be stated. If not specified, the plates will be rolled to the most approved thickness.

The very best imported platinum can be procured at $8,00 per oz., in plates rolled the required thickness. A quality inferior can be obtained, but the best imported cannot be had for less.

MESSAGE HEADS.

This item of consumption is one of no ordinary consideration. The great quantity used necessarily occasions a large expenditure. The amount employed by the Morse lines of America exceed 10,000,000 per annum, of which New-York City uses about 1,000,000. These estimates may appear large, but they are much less than the calculations of several gentlemen engaged in the active duties of telegraphing. Message heads are purchased by offices, and sometimes by the officers of the companies.

The prices paid range from $1,67 per 1,000 to $5,00 per 1,000. Several million are bought at $4,50 per 1,000. Estimating the average cost to be $2,50 per 1,000, the annual cost will be $25,000.

This large outlay ought not to be made without reflection, and the opportunity is now presented for making a very great saving. The Secretary can supply message heads, printed on good paper, equal to that used by any line in America, at $1,20 per 1,000. If all the lines would use the same paper as the Magnetic Company, the message heads could be furnished at $1,10 per 1,000. The proposals are arranged to meet the diversified opinions of companies.

The reduction in the cost of message heads, from the prices named to $1,20 per 1,000, will occasion a gain to the enterprise of a startling amount. The price paid now as an average is $2,50 per 1,000 on 10,000,000=$25,000; the price proposed $1,20 per 1,000 for 10,000,000=$12,000. Nett gain $13,000!

ENVELOPES.

The quantity of envelopes used is not as great as that of message heads; the amount will be considered 6,000,000. Of this, there are about 4,000,000 white, and 2,000,000 buff. The cost of the white will average $2,50 per 1,000. The cost of the buff will average $1,70 per 1,000. The cost of buff has ranged from $1,37 to $2,50 per 1,000. These estimates are upon white embossed, and printed buff envelopes. The annual cost, at the above prices, would be for white embossed $10,000; for buff and printed, at $1,70 per 1,000, would be $3,400; making an aggregate of $13,400.

The Secretary is now prepared to furnish white envelopes embossed, equally as good as the best now used by any line in the United States, at $1,60 per 1,000, and the buff printed at $1,20 per 1,000. If the buff are embossed, the price will be $1,10 per 1,000. The aggregate estimate upon these prices will be for the white envelopes $6,400; for the buff envelopes $2,400; making a total of $8,800. Nett gain, $4,600.

The prices now proposed are greatly under former rates. The proposal contemplates the supply of all the lines, and hence the reduced rates.

CLOCKS.

Arrangements have been made for procuring a superior quality of clock, from one of the most extensive manufactories in Connecticut. The face is about 12 inches in diameter, gilt frame, having the time of the hour, minute, second, and day of the month, all represented on its face, and to run eight days. Made

to run lying on the table, hanging on the wall, or in course of transportation. The manufacturer says, he "will warrant them to keep the time correct, as to *day of month*, *hour*, *minute*, and *second*, and that he will start them with genuine Connecticut time, and tumble them over railroads, wagons, steamboats, drays, and by hand, and land them in Halifax, or St. Louis, still running, with the correct dial time of New-England. He will mark the moment of shipment, and its time of delivery will indicate how long the clock has been wandering to its new home." The price is $10 each. The stamp *American Telegraph* will be on the face of each one, and all will be warranted.

PENCILS.

The prices paid for pencils have been from 50 cents to $1,00 per dozen, and often a very inferior quality purchased. The number used per year exceeds 50,000. Supposing the average cost to be 60 cents per dozen, the total will be $2,500. The Secretary can furnish the best pencil made at 22 cts. per dozen, for Nos. 1, 2, 3, and 4. At this price, the cost in the aggregate will be $916,66. Nett gain $1,583 34. The pencils are to be well made, capable of making the finest point, without waste. They will be manufactured in Germany.

PENS.

There are millions of pens bought by the various lines. No one consulted places the aggregate less than 4,000 gross. Price paid from 60 cts to $1,25 per gross, average about 90 cts., total $3,600. These pens can be purchased for the lines at 30 cts. per gross. For the same quality, form and stamp, manufactured by the same firm in Birmingham, England, I paid in Louisville, St. Louis, &c. $1,25 per gross. It will be seen that on this small item the nett gain will be large. Thus, cost at 30 cents= $1,200 00. Nett gain, $2,400. They will be stamped in England, *American Telegraph Pens.*

BLACK INK.

The lines use a very large quantity of black ink, being about 4,000 quart bottles per annum. The best quality is retailed in New-York at 75 cts. per bottle. In the West and South it is sold at $1,00 to $1,25. Put the average at 80 cts. and the total will be $3,200. The same ink thus sold, the Secretary will fnrnish at 28 cts. per quart bottle, well corked, sealed and labelled. At this price the total will be $1,120 00, making nett gain $2,080. The ink will be labelled *American Telegraph Ink.*

The Secretary is not prepared to submit estimates of the cost of the many other kinds of materials required by the lines, such as red ink, inkstands, files, screw-drivers, battery brushes, instru-

ment oil, magnet springs, screw-nuts, register paper, foolscap and letter paper, copper wire, plyers, solder, soldering-lamps, registers, magnets, keys, catgut, circuit breakers, lightning-protectors, repeaters, circuit-shifters, message-files, paper clips, &c., &c., embracing every thing used in the management of the telegraph. The subject has been sufficiently investigated to warrant the assertion, that in the purchase of every article a saving can be realized.

REGISTERS AND MAGNETS.

Relative to registers, magnets, keys, and other parts of the machinery, there will be vast improvements submitted. Not by the introduction of fanciful ideas or the application of new principles, but by the proper construction of machines, calculated to make them last, and prove serviceable, totally disregarding all freaks of fancy in the peculiar scroll, harp, fiddle, or banjo construction of the instrument. There is no reason why a machine should not wear twenty years, as certainly as the varieties of machinery common in mechanics. The re-supplying of lines every few years is a heavy tax. To re-supply the offices of America with machines will cost at least $75,000. The breakage of an instrument has frequently occasioned more loss than the price of a dozen, and generally, this loss is occasioned by the application of fanciful ideas, without regard to utility. The enterprise throughout the country may depend upon this subject receiving from the Committee the most careful consideration.

AGGREGATE ANNUAL EXPENSE.

Having considered the cost of the various materials common in the telegraph service, the annexed summary is presented, as being worthy of the most candid reflection.

Materials.	Present Cost.	Proposed Cost.	Nett Gain.
Nitric Acid	23,961 60	16,972 80	6,988 80
Sulphuric Acid	2,500 00	1,000 00	1,500 00
Zincs	1,980 00	1,320 00	660 00
Quicksilver	3,000 00	1,950 00	1,050 00
Message Heads	25,000 00	12,000 00	13,000 00
Black Ink	3,200 00	1,120 00	2,080 00
Envelopes	13,400 00	8,800 00	4,600 00
Pens	3,600 00	1,200 00	2,400 00
Pencils	2,500 00	916 66	1,583 34
Totals	$79,141 60	$45,279 46	$33,862 14

Nett gain, $33,862,14!! What argument could be more commanding? Look at this immense saving, and then who can doubt the general utility of a concentration of the purchase by the lines? Not only is the gain in money as presented, but the

pure and unadulterated material is procured, and more efficient service obtained. Some of these estimates will appear large, but they are based upon an average scale, procured from reports of various lines. The lowest estimates have been taken in all cases where there was a difference of opinion, and experience will, beyond all doubt, establish the fact that the table of costs is really below the true sums now paid.

In procuring the articles from the Secretary, there will be no nitric acid mixed with oil of vitriol to increase its scale of degrees, and at the same time rated as equal in value to the pure article. No sulphuric acid with false gauging, and mixed with exhausted acid. No zincs, alloyed with lead, tin-solder, and iron. No quicksilver alloyed with 20 per cent. of lead, tin, or other base metals, destroying its usefulness and durability. No porous cups made of brick-dirt or clay, of density preventing a flow of nitric. No tumblers, almost as thin as wafers, causing breakage of 50 per cent. per annum. No platinum alloyed with metals of half value, thereby preventing durability. No message heads at enormous rates and waste of revenue. No envelopes at double prices for inferior quality, and of every species of paper. No pencils of inferior lead, causing a great waste in pointing.

Such are the views entertained by the Secretary, in the fulfilment of the important resolutions submitted to the American Telegraph Convention, as herein-before recited.

PRICES PROPOSED.

The following are the prices now proposed, and upon which the lines may depend in every particular, viz. :

Nitric Acid, per lb	8½cts.
Sulphuric Acid, "	2
Zincs, "	8
Quicksilver, "	65
Message Heads, per 1,000	$1 20
Envelopes, Embossed, per 1,000, White	1 60
" " " Straw colored, extra	1 60
" Printed " Buff	1 20
Pencils, per dozen	22
Tumblers "	2 00
Porous Cups "	62
Black Ink, quart bottles	28
Platinum, per oz.	8 00
Pens, per gross	30
Clocks, each	10 00

The straw-color envelope is a very superior article. The die will emboss that color of envelope better than the white. If generally adopted, the manufacturers contract to place water-marks in the paper, indicating it as the telegraph paper, and granting the lines its exclusive monopoly. The same idea will be proposed as to message-head paper.

CASH PRINCIPLES.

The Secretary has no power to contract debts without being individually responsible. The rates proposed are cash prices. No proposals were sought on the credit system, because no means could be devised to meet the case. The cash principle is the only plan to insure success.

The lines can estimate their supplies for the coming quarter, or year, and the whole shipped under one invoice. This will be a point in economy. The arrangements are such, that an order for all the materials, and for any quantity, and even for a million of message heads, can be placed in transportation within twenty-four hours after the time of its reception by the Secretary.

All orders must be addressed to the Secretary, at *Washington City*, and any requiring the action of the Committee thereon, will be promptly submitted.

That there may be increased confidence in the arrangements herein proposed, the Secretary will give such bonds as may be deemed necessary by the Committee.

The cost of the dies for embossing the envelopes will be $5 each. The cost of electrotypes to print the envelopes will be $1 to $2 each. The cost of electrotypes for printing message heads will be $1 to $2 each, and for duplicates 50 cents each. These expenses will be extra, and they will remain as the property of the Company.

Before closing, the Secretary would state that he is now wholly employed under the directions of the Committee, appointed by the late American Telegraph Convention, in carrying out the actions of that body. Their counsel will form his course of duty, and his energies will be untiring in the service of the enterprise. He feels too much interest in the general prosperity, to allow any part of his duty to remain unperformed. His determinations are, to render all service possible calculated to elevate the Telegraph, and the accomplishment of deeds tending to promote the general and universal weal.

Respectfully submitted.

TAL. P. SHAFFNER,

Secretary.

Editorial.

INTRODUCTORY.—The TELEGRAPH COMPANION, as now issued, is an improvement on the old series, or original issue. The quarto form was inconvenient.

The doctrines promulgated through this work will be relative to the Science and Art of Telegraphing. Many years' connection with the Morse American Electro-Magnetic Telegraph,—a participator in the struggles in its extension over thousands of miles of territory, even along the borders of, and before the doors of the red man's home, and an attentive student in the various legal investigations in the courts of the country, have infused into our mind a firm conviction of its superiority and originality over all other Electric Telegraphs of the present age.

Our teachings will be, to sustain this conviction, being in accordance with the decrees of many of the most learned jurists of the land, and the sanction of the American people.

In promoting the ends in view, we do not desire to discuss them in a manner calculated to cast any disrespect upon other systems of Electric Telegraphs, but at the same time, a candid discussion of the merits and relative rights of the diversified systems must be expected. We speak thus frankly, that none may be deceived in the policy pursued.

The whole range of Telegraphing will be considered, embracing the manner of management, working and general policy, the construction and repair of lines, the various departments of operation, and qualities of materials consumed, and every thing requisite to elucidate the manual of Telegraphing.

We invite a fair consideration for the COMPANION, and a liberal encouragement. With these remarks, we submit the first number.

TAL. P. SHAFFNER.

TERMS AND TIME OF PUBLICATION.—The Companion will be published monthly, 48 pages in each number, octavo, making over 600 pages per annum. Terms—$2,00 per year, payable in advance.

The Companion, proper, will be wholly letter-press writings, and will embrace one number of the Compound Tariff Scale. The Tariff Scale will be a separate publication. The works will issue on the first of each month.

THE COMPOUND TARIFF SCALE will contain 32 octavo pages, and devoted entirely to Tariff affairs, being 30 pages of rule and figure work, and two pages of explanatory notes relative thereto.

Terms—$2,00 per year. It will be issued monthly, with all the corrections of Tariffs, and new offices established by the new lines built.

Companion and Tariff Scale.—The Companion will be sent to subscribers for $2,00 per year. The Tariff Scale will be forwarded at $2,00 per year. Both publications will be sent to one address for $3,00 per annum. We hope every Operator, and every Officer of the different Companies, will give us the necessary material aid in the publication of these important works. Merchants would find the Tariff a very useful book in the counting-room. Stockholders would find the Companion a useful book in obtaining a proper understanding of the art of telegraphing. We hope to have the co-operation of all in accomplishing the grand desideratum.

Our Publications again.—We desire it to be distinctly understood, that in the publication of these works we do not expect gain. They will cost more than the subscription. Already there has been expended nearly one thousand dollars, and the most unanimous subscription will not meet the outlay. We hope, however, the Companies will give all the aid possible. If the works pay expenses of printing, it is all we desire. Our labor and responsibility will be gratuitous in the premises.

Old Subscribers.—The subscribers to the Companion during the last year can have their choice in taking either of the works for the coming year at the same price. We will send to the Company subscribers the Tariff, knowing the object of their subscription to be for it. To the Operators we will send the Companion. If any change is desired, we will cheerfully comply.

Delay of Publication.—The delay has not been intentional, or for want of energy, but as a question of policy. The change of place of publication from Louisville to New-York, and the change of positions from the Presidency of the St. Louis and New-Orleans line, to the Secretaryship of the General Confederation, required a change in the order of things, to meet the necessities of the future. It is our purpose to publish the work, let the subscription be large or small.

The American Telegraph Confederation will hold the next annual meeting in Washington City, on the 6th day of March, 1854. A representation from every Morse line in the United States, Canadas, Mexico, Nova Scotia, or in other words, every line in North America, is expected to be represented there. We have already heard of the appointment of many delegates to attend that meeting, and we hope others will promptly act in the matter. Where Presidents or Superintendents have authority to represent their lines, it is hoped they will not fail to attend.

We would call attention to the official circulars in the present number, as involving important facts for the consideration of every Company.

Atmospheric Telegraph.—During our recent trip to Boston, we visited the rooms of the Atmospheric Dispatch Company, No. 24 Merchants' Exchange, State Street.

We had but little confidence in the practicability of the enterprise, prior

to an examination of the machine and witnessing its operation. The tubes were made of lead, about two inches in diameter, and about twenty feet long. The feasibility of the invention for the uses designed was demonstrated by various experiments. Although the operation seemed to be perfect, yet we entertained doubts as to the ultimate success of a long line; but Mr. I. S. Richardson, the talented inventor, readily presented arguments, based upon fixed laws in philosophy, dispelling all fears. Important results will characterize this invention, though many difficulties will occur in its early progress. After fruition is attained, there will be hundreds claiming to be the original inventor. Like the history of Morse, men who were slumbering in ignorance for years later than his invention, have come forward and claimed to be *the* sole progenitor of the great art, conceived by Morse, and brought to perfection by the toil of years.

The Atmospheric Dispatch Company contemplate constructing a line from Boston to Worcester, as the first section of a line to New-York. The shares are $100 each, payable in calls of ten per cent., commencing on the 1st of February, 1854. Total capital stock, $500,000. The tube to be two feet in diameter, for conveying letters and packages to and from the said cities and intermediate places, allowing fifteen minutes to each transit.

Although we feel confident of successful results from the art invented, yet we cannot believe in the realization of all the hopes entertained by the worthy and ingenious inventor. If it accomplishes one-half, the triumph will be great. The achievement will rival in brilliancy the brightest star of this progressive age. It will be one of the most marvellous and resplendent gems that bedeck the illustrious escutcheon of American ingenuity.

Telegraph Magazine.—It has been announced that the Companion, published heretofore at Louisville, was to be united with the Telegraph Magazine, published in New-York. Such was the design of the proprietors of the two publications, but circumstances have occurred rendering the union inexpedient.

A Baby Battery.—While on a visit to Boston, not long since, we called on Messrs. Palmer & Hall, Telegraph Instrument Manufacturers, and were shown a baby battery, composed of zinc and copper, and dilute sulphuric acid. The plates were one-eighth of an inch square, and as thin as a common wafer. The action of the battery was sufficient to work the largest Relay Magnet. It was a beautiful exhibition, and its minuteness gave it no ordinary degree of novelty.

Alarm Telegraph.—Houses are now being built, in cities, with telegraphs connecting each window and door with the bed-chamber; so that in case of the entry of burglars at night, an alarm-bell is sounded, waking up the residents, and advising a sudden retreat of the nocturnal invader. This is an important improvement, worthy of general use.

A New Battery.—We had the pleasure of examining a new galvanic bat-

tery, invented by Mr. Moses G. Farmer, Superintendent of the Electric Telegraph of the Boston Fire Department. Gallon Jars, large porous cups, and amalgamated zinc are used, differently constructed from Grove battery. The mode of application secures a constant battery for some thirty days without renewal. We hope to have a detailed account of the invention of Mr. Farmer, and if it proves more economical, and attains an electric current equal to the Grove battery, it will deserve the immediate consideration of the various Telegraph Companies.

Balize Telegraph Line.—This line extends from Algiers, opposite New-Orleans, to the Balize, at the mouth of the Mississippi river. It is owned by the Union Tow-Boat Company, and is well managed. The length is 120 miles. To commerce it proves to be of infinite value.

The Telegraphs in Canada.—In no section of America are there more lines in progress of construction than in the Canadas. We hear of some three thousand miles now being built. These lines will greatly aid the general system, and advance the prosperity of existing lines. As soon as we can collect proper material, we will give more definite news as to their extent.

Atlantic and Ohio Telegraph Line.—This Company has two wires from Philadelphia, through Harrisburg and other towns, to Pittsburg. A leased wire from the Magnetic Telegraph Company between Philadelphia to New-York, is worked by this Company as a more direct connection with the latter city. Mr. David Brooks has lately been elected Superintendent of the lines of this Company. Mr. Brooks is a gentleman well qualified for the station, and a thorough telegrapher. He is familiar with all the various departments, and his acts are characterized with excellent judgment. He labours for success by an economical and judicious management, laying aside all freaks of fancy, and adopting the useful. We most certainly wish him success, and that the prosperity of the line may be triumphant.

The Magnetic Telegraph Company.—This is the oldest Electro-Magnetic Telegraph Company in the world. It extends from Washington, through Baltimore and Philadelphia, to New-York. It has seven wires. The management of this line is somewhat peculiar, but well suited to its necessities. In a future number, a detailed account of the system will be given, believing that other lines can be benefited by the adoption of equivalent plans of operation. Wm. M. Swain, Esq., is the indefatigable and talented President.

Boston and Portland Line.—For many years the line between these two cities has been owned and managed by the Hon. F. O. J. Smith. Recently he sold the entire line, 120 miles, to the Maine Telegraph Company, which gives it a continuous wire from Boston to Calais, Me. The steamers' news is now sent direct from Halifax to Boston. We ardently hope that this line will realize a handsome revenue; but we cannot comprehend the neces-

sity of connecting with an adversary in Boston. Morse lines ought to connect with each other. The policy adopted by Mr. Smith, a few years ago, refusing business from illegitimate lines, was universally condemned. We can see but little difference in the policy now adopted by Mr. Eddy, the Superintendent, in his separation from the Morse lines in Boston and connecting with the House line. The largest patronage received from other lines is from the Morse Companies. The return business is sent back, by Mr. Eddy, through a different line, and one too, limited in extent, connecting but few towns in the United States. The consummation of prosperity is only attained by an unbroken connection.

New Magnetic Battery.—A short time since we visited Providence, R. I., to witness the operation of a new battery in course of construction, designed to propel boats, or used as a motive power in mechanics generally, and to be applied to Telegraph lines. Mr. Calvin Carpenter, the inventor, has displayed a great deal of zeal and genius in the construction of the work. A patent has recently been granted him for the invention. We saw various experiments performed, and they were really wonderful. A small wire was placed in the circuit and instantly burnt into pieces. The power was great, and the current of electricity seemed to be even, and attaining what some gentlemen style quantity and intensity as verified by the diversified tests. The large battery, Mr. Carpenter estimates, is equal in strength of 100,000 pounds. In a future number we will give a minute description of the machine. To Mr. F. O. Gilbert, Manager of the Telegraph Office, and to Gov. Jackson, we are indebted for much information derived while at Providence.

Iron Wire.—In the construction of Telegraph lines, a good quality of iron wire is more important than any other portion of material used. For the same reason that required the copper wire to be taken down from the early lines, demand the use of the very best iron wire that can be procured. We have seen all qualities used. Some worthless, and some very superior. Messrs. Dewey & Co., at Wheeling, Va., have probably manufactured the best wire employed for Telegraph lines west of the mountains. The wire was made from the Missouri Iron Mountain ore, which is doubtless superior to any other iron of America. We think so, because the wire manufactured from that ore has proved the most substantial.

Recently we were shown some specimens of wire from the extensive manufactory of Mr. Henry S. Washburn, at Worcester, Mass. It excelled all other wire that we have witnessed. The testings were startling and almost beyond belief. We have never seen wire of equal quality used by any line in America, though we understand that Messrs. Smith & Ward—who are very worthy and energetic gentlemen—have purchased a lot of the same wire for some new lines being constructed by them in Texas.

The question as to quality of wire will be presented to the General Committee, at Washington City, and we indulge the hope that some means will be adopted to aid Telegraph builders in procuring the very best wire in the construction or repairing of lines.

The St. Louis and New-Orleans Telegraph.—This line extends from St. Louis, Mo., to Nashville, Tenn., via Cairo, Ill., and Paducah, Ky. Length, about 400 miles. River crossings has greatly retarded the prosperity of this line. During the past summer, submarine cables have been laid across the various streams, and now the Company work successfully through cables across the Ohio, Mississippi, Tennessee and Merrimac rivers, making the most extensive submarine line in America. A reliable connection south of Nashville with New-Orleans, will enable the line to pay a handsome dividend at an early day. Col. Wm. Tanner is President.

New-Orleans and Ohio Telegraph.—The line of this Company extends from New-Orleans, via Vicksburg, Nashville, Louisville, Maysville, Cincinnati, Wheeling, to Pittsburg, connecting with the lines running to New-York, giving a direct intercourse thereto from New-Orleans. This Company has two wires from Louisville to New-Orleans, which makes not less than two wires from Boston to New-Orleans. The revenue of this Company is nearly $200,000 per annum, and is rapidly increasing. Col. Wm. Tanner is President. While the Company has the services of one in whom confidence can be so implicitly placed, as can be with Col. Tanner, there need be no fears of the property of the Company being wasted away, by wild and extravagant schemes, such as has marked the career of some other lines in America.

Rail-Road Telegraphs.—Since it has been established, that Telegraph lines greatly benefits the Rail-road routes by economy in running, and safety of lives, nearly all of the leading roads in the country are securing lines along their routes, and appropriating liberal sums for their use. The day is not far distant, when every Rail-road throughout the land will be compelled to adopt the use of the Telegraph in the running of their trains. We will discuss this question in future.

Pittsburgh, Cincinnati and Louisville Line.—The Company extends from Pittsburgh via Cincinnati to Louisville. Two wires the entire distance. This line is one of the best in the United States, having business connections with several long ranges. Mr. Jackson Duncan is Superintendent, and is actively engaged in the management of the line. Mr. Duncan is a practical man, well qualified for the office, and ere many months the Company will realize the advantage of having a Superintendent, who studies the economy as well as theory of operation. The man that can go out on the line, and partake with the men in the hardships of repairs, like Mr. Duncan, Mr. Brooks, Mr. Woods, and a host of others like them, are the men for Superintendents.

Telegraph Incident.—Early in November last, the wire of the Montreal Telegraph Line, near Northfield, Vt., was by some means caught by the locomotive of a train of cars, on the Vermont Central Rail-road, and stripped from the poles for a distance of fifteen miles. This demonstrates two facts: 1st, that the wire was good, and 2d, that the poles were totally worthless.

Boston Telegraph Offices.—The lines running into Boston have, nearly all, offices of their own, which necessarily occasions great inconvenience, and increased expense.

The Boston and New-York line has an office in building 76 State-street, up stairs. Bain line to Portland, in same office.

The Northern line to Montreal is in same building, first floor in rear.

The Vermont and Boston line has an office in same building, up stairs.

The Maine Telegraph line has an office on first floor, Traveller Building, 31 State-street.

Marine Telegraph line is in the Merchants' Exchange Reading Room.

The Boston, Lowell, Troy, House line, is in 77 State-street.

The New-York and Boston, House line, is in Traveller Building, 31 State-street.

The offices are very accessible; but the people must be well informed in telegraphing to know what route to patronize.

New-York and Boston Line.—This Company is styled "The New-England Union Telegraph Company." It has five wires, with many lateral branches. The wires embrace all of the Morse and Bain lines. The latter system has been totally abolished, and the Morse machines substituted.

This is one of the most important lines in the United States, connecting two of the largest cities in the Union. Unfortunately it has been allowed to go to wreck, and nearly the whole requires rebuilding. The insulation is mixed. Every kind, and nearly the very worst ever devised, is in use. It is astonishing to see such a state of affairs on an important line like this. It has not worked successfully for some time past, and never will until thoroughly repaired. Mr. Charles F. Wood, late of the Magnetic Office, in New-York, has been elected Superintendent. He has been for some time engaged in repairing. Mr. Wood is a finished telegrapher. He knows his duty, and he is nobly performing it. His perseverance is equal to the necessities of the task, and his fine judgment brought to use in the execution of his office, will produce results, crowning his efforts with the most cheering and triumphant success.

Wade Telegraph Lines.—These lines are those built and managed by J. H. Wade, Esq., of Ohio. One embraces the Cincinnati, Columbus, and Cleveland line; another, the Cincinnati and St. Louis line, and in addition, several branch lines and Rail-road routes. Mr. Wade is building an extensive range of lines along the Rail-roads in Ohio and Indiana. If there is a telegraph man in the United States deserving of credit for energy and good management, it is Mr. Wade. He has conducted his lines upon a liberal, yet economical scale. He does not falter in expending a dollar where ten-fold will result therefrom. Some managers of lines hold on to the dollar, and allow the line to go to wreck; others, again, spend every dollar for fancy and extravagant show. Not so with Mr. Wade. He is a saving man, energetic and just, possessing abilities equal to his position. Success has

crowned his efforts, and his career as a telegrapher has been marked as conservative, and equal in skill to that of any other gentleman engaged in the enterprise.

New-York, Washington, and New-Orleans Line.—This Company is one of the pioneer lines in the United States. It was built by Mr. John J. Haley. The line extends from Washington City, via Richmond, Va., Raleigh, N. C., Columbia, S. C., Macon, Ga., Mobile, Al., to New-Orleans. A leased wire, belonging to the Magnetic Telegraph Company, connecting the line of the Company at Washington, direct with Philadelphia and New-York, is also under the management of that line. The office in New-York greatly increases the revenue of the line. Its income is very large. S. Mowrey, Jr., is President, and although new in the business, we have unlimited confidence in his superior judgment in the management of the line. It is one of the longest in the United States, and the difficulties of working are many. The most patient and energetic man will have times of sorrow; but we think Mr. Mowrey will never allow *fail* to enter his mind. He meets a liberal and hearty encouragement from the many gentlemen employed on the line, and his success may be considered as beyond doubt.

Texas Telegraph Line.—While Texas existed as a Republic, Prof. Morse presented his Patented Telegraph to the nation as a token of respect and esteem. He receives no consideration for lines constructed in the State of Texas.

We understand that Messrs. Smith and Ward are pushing forward the construction of many miles of lines in Texas. They have had to contend with many difficulties, but we are rejoiced to hear of their success. Their perseverance entitles them to great praise, and liberal realization of material relief.

Western Telegraph Line.—This line extends from Baltimore, via Frederick, Harper's Ferry, and Cumberland, to Wheeling, with a branch from Brownsville to Pittsburgh. It is about 360 miles long. The Company, last summer, made a contract to run a wire along the Baltimore and Ohio Rail-road. The line will be completed on or before January, 1854. This Company is paying a dividend, and the prospects for the future are very encouraging. Geo. R. Dodge, Esq., is President.

Bain Line from Lowell to Gardner.—A line of telegraph has been erected from Lowell to Gardner, Mass., via Fitchburg, on which the Bain system was designed to be worked. The revenue not being sufficient to sustain it, the property has been sold, and operations suspended. Some of the wire has been taken down. Small routes, or lines, having many offices, can only succeed with the use of the Morse system. Transferring work from one office to another, at will, is one of the principal elements of success.

Indiana and Illinois Line.—This range of lines is very extensive, running from Cincinnati to Dayton, Indianapolis, Terre Haute, Detroit, Chicago

&c., being in length over 700 miles. During the past year, it was leased for a term of years, to Mr. Ezra Cornell, who is one of the oldest telegraphers in America. He was on the first line built, and his experience and ingenuity enables him to surmount many difficulties that ordinary men would fail in their efforts to overcome. Mr. C., like many of the old telegraphers, has braved the storms and tempests, and we do hope the remainder of his career in the telegraph will be as brilliant and chcering as his pathway in the past has been rugged and gloomy.

Yellow Fever in the South.—This fatal disease has, during the past summer, swept over the Southern country with disastrous results. Towns and cities suffered sadly. In the midst of the epidemic, the telegraph lines were not excepted; many of the operators were the victims of the fever. Mr. B. P. Crane, Mr. Achilles Herbert, and others of the National lines in New-Orleans, fortunately recovered. Not so blessed were H. F. Watkins, chief operator at New-Orleans, W. H. Grogan, and T. S. Titcomb, formerly of the same office, and also W. Clayton, chief operator of the Mobile office, of the Washington line. They were victims of the fell destroyer. They were faithful and efficient officers. We record their early departure from among us, with pensive feelings, that useful men like those should be so early "borne from whence no traveller returns."

Maysville Submarine Cable.—We regret to learn that the electric cable, constructed for the Maysville, Ky., crossing, proved worthless, after applying the greatest energy to secure success. Cause of failure was over-heating the gutta percha, destroying its insulation, and thereby connecting the electric wires. Cables constructed on the same principle can be made effective by proper care and the use of suitable machinery. The reels were too small, and the twist proved fatal.

New-York, Albany and Buffalo Line.—We are rejoiced to hear of the prospects of this line. The Company has several wires on their main line, and also a number of branch lines as feeders. Mr. F. H. Palmer, of New-York, is the Superintendent of the line from New-York to Utica, and Mr. O. E. Wood, Superintendent from Utica to Buffalo. These gentlemen are practical managers, and well versed in the art of telegraphing. If the line cannot succeed under the management of such gentlemen, there can be but little hope in the future. They are actively engaged in making repairs, and, ere long, the line to Buffalo from New-York can be relied upon as one of the most efficient and reliable in the United States. Mr. John Butterfield, of Utica, is President.

Newfoundland Telegraph Line.—We understand that this Company has suspended further work in the construction of the submarine line to Cape Race, from Halifax, until spring. They are confident of success. The steamers to run in connection with this line, between Galway and America, are in course of construction. Unparallelled speed is expected in the running of these steamers.

House Lines.—The line of this system running from New-York to Washington, is doing a very fine business. Mr. Henry J. Rogers is the Superintendent. He is one of the oldest telegraphers in the United States, having been associated with Prof. Morse in the management of the first line in America, and is well versed in the science of electric telegraphs. Various improvements have been invented by him, and his diversified talents are equal to any emergency. We regretted that Mr. Rogers found it to be his interest to leave the "art that has worked so well" amid storm and tempest.

The line from New-York, via Albany, Buffalo, Cleveland and Cincinnati, to Louisville, is under the Superintendence of Mr. Anson Stager, of Buffalo. It is a long range of lines, and the difficulties of management must be very great. Fortunately, however, for the Company, Mr. Stager is well qualified for the position. He is a thorough telegrapher, understanding the working of lines as well as any other gentleman engaged in the business. His zeal and qualifications entitle him to richer rewards than are usually attained in the telegraph enterprise.

The business of the line from New-York to Louisville is very large and rapidly increasing.

Damage by Sleet.—The recent storms in the north greatly damaged the Telegraphs. The New-York, Albany and Buffalo suffered very much, but the line from Orwell, Vt., to White Hall, N. Y., and thence to Rutland, Vt., was totally destroyed. The wire was broken between nearly every pole. The damage was so great that fears are entertained that the repairs will not be completed before spring.

Telegraph Controversies.—We have received a communication, with a request for publication, from a friend, which reviews very critically the management of one of the lines in the United States. We would gladly publish it if we thought good would be the result. We desire to be cautious in meddling with the private affairs of Companies. We prefer to point out remedies for evils, without being too particular in noticing the localities of existing wrongs. Where an evil affects the general system of telegraphing, we will not fail to condemn, hoping to promote prosperity, and not foster contentions.

Correspondents.—We respectfully invite letters from telegraphers of all positions, relative to the mode of telegraphing, and all news pertaining to lines, and business thereon. Any question of the science is a matter of interest. Let every body write.

A Model Battery.—There is nothing about the telegraph business more essential in successful management, than care in the battery series. We always visit the batteries wherever an opportunity offers. Among those of the most beautiful and best arranged in the United States, is that in the New-York office of the New-England Union Company, under the management of Mr. Charles T. Smith. He has had as much experience in batteries as any other gentleman in the country, and he adheres to the settled

doctrines of the Grove series. Experience of many years has demonstrated its superiority, and he delights in witnessing its perfection. It must afford the early projectors of electric telegraphs great pleasure, to find the old veterans in practical telegraphing, like Mr. Smith, dispel all the new doubtful schemes, and hold to that which has proved to be profitable and wholly successful for many years.

Cuba Telegraph Lines.—We see announced, through the press, the suspension of the further erection of the telegraph lines in Cuba, by the Government.

Western Telegraph.—The stockholders of the Texas and Red River Telegraph Company assembled at Shreveport, and organized by electing the following officers:

President—D. S. Welder. *Secretary*—J. G. Battle. *Directors*—B. P. Crane, D. F. Roysden, J. W. Morris, of Shreveport; L. R. Walmesly, T. H. Aives, of Natchitoches; H. Lynch, M. Ryan, T. C. H. Smith, of Alexandria.

The stock was very fully represented, and the best spirit prevailed. No doubt is entertained of the completion of the line at an early day. The yellow fever has greatly hindered the builders in its construction, but their energies are equal to the most extraordinary difficulties. The line is built by Messrs. Smith & Ward.

William Tanner, Esq.—We had hitherto neglected to mention the fact, that this gentleman, who has been so long and favorably known to the public as an editor and telegraph proprietor, has recently been elected President of the St. Louis and New-Orleans Telegraph Company, to fill the vacancy occasioned by the resignation of Tal. P. Shaffner, Esq., who goes to Washington City, as Secretary of the American Telegraph Confederation. Two better men for the posts they have been called to fill, could not be found; and we congratulate them both, upon their *upward tendency.—Pad. Penant.*

Submarine Telegraph Cables.—We shall, in future numbers of the Companion, discuss the various modes of crossing rivers. From sad experience we are convinced that masts are not the most reliable nor economical. The following notices, from the press, are a few pertaining to the electric cables submerged in the western waters. The newspapers throughout the country have favorably noticed these cables, and their superior excellence is evidenced from the tests applied. Though they pertain to our own work, yet we hope their republication will not be considered out of place, contemplating, as we do, to give the progressive movements in the entire telegraph enterprise, and the subject of submarine crossings is one of great importance to the prosperity of many lines. Since the construction of the cables, mentioned in the following notices, the same gentlemen have invented very great improvements thereon. Here are a few notices:

Submarine Telegraph at Paducah.—The great submarine Telegraph Cable, on the St. Louis and New-Orleans Telegraph Line, was laid across the Ohio river at this place, on Monday last, the 26th inst. We examined this strange piece of mechanism, a few days previous to the time it was deposited

in its watery abode, and was not a little astonished at its wonderful strength.

The whole forms a cable of near two inches in diameter, and it is much the largest and most substantial cable of the sort *in the known world.*

We are told that the great cable across the channel from England to France, is inferior in size to this, and by no means as well insulated for electrical application; while, in point of strength, it will not compare at all with the one at this place.

This stupendous wire, which now conducts the lightning from shore to shore, beneath the bed of the majestic Ohio, is 4,200 feet in length, and the longest one to be found in the United States. It has been constructed by that amiable and accomplished gentleman, Tal. P. Shaffner, Esq., late President of the Company, and now Secretary of the American Telegraph Confederation, assisted by J. B. Sleeth, mechanical engineer. These gentlemen have made improvements in the construction of cables, both scientific and mechanical, which will entitle them to Letters Patent, and the country may well be proud of them, as men of skill and ability, in whatever they may undertake.

The wires on this line, we understand, have been exceedingly troublesome and expensive to the Company; upwards of $20,000 having been expended in unsuccessful efforts to cross the Ohio river in such a manner as to secure them against accident; but this great effort has accomplished the object, and there can be no future loss sustained, on account of breakage of masts, wires, &c.

We rejoice that the work has been successfully accomplished, and that it has proved fully equal to the most sanguine calculation our friend Shaffner had made of its utility. We had the pleasure of receiving the first dispatch which ever passed under the Ohio, on this mammoth cable, which run as follows:—

"Illinois Bottom, *July* 26, 1853.

"Col. Pike:—I send this through the great cable, successfully laid to-day.

"Shaffner."

Success to Shaffner! He may well be styled the "Lightning King," after this! May he live a thousand years, and succeed in everything which he undertakes, as he has in this instance! We regret to learn that he will soon go from amongst us, to engage in his new duties at Washington city; but even from that far distant point, we shall expect to hear from him occasionally through the medium of electricity, which seems to be his favorite element.

Submarine Telegraph Cable.—Tal. P. Shaffner, Esq., the former enterprising President of the St. Louis and New-Orleans Telegraph Company, arrived in our city on Tuesday last, and was engaged yesterday in laying the Submarine Telegraph Cable. It was put down about a half a mile above here, and was towed over to the other shore of the Mississippi by the steam ferry. Its length is about 3,710 feet.

From the size and great strength of the wire, we have no doubt it will withstand the swift current and snags of the old father of waters for a century to come. May unbounded success attend its projector.

There is another roll of this cable on our wharf, intended for the Merrimack river. We understand it will be laid in a few days.—*Cape Girardeau Eagle.*

Shaffner's Lightning Ferry.—On Monday, the 26th July, Tal. P. Shaffner, Esq., whose pet is lightning, laid across the Ohio river, on the New-Orleans and St. Louis Line, about a mile below town, his great telegraph cable, the longest in America, and the largest in the world. This cable is 4¼

inches in circumference, fourteen hundred and forty yards long, and weighs eleven thousand pounds.

Last fall Mr. Shaffner constructed and laid across the Tennessee river, his first cable of this kind. During the winter and spring the freshets were greater than usual, and the great cable triumphantly resisted all forces coming in contact. The experiment confirmed the most sanguine hopes of the constructor, and Mr. Shaffner has commenced laying the cables at every crossing on the line. This line has more submarine telegraphing than any other line in the United States. Heretofore the companies have been much annoyed by the inefficacy of their submarine apparatus. Mr. Shaffner has been assisted in the construction of this cable by J. B. Sleeth, mechanical engineer.

The cable between England and France is inferior to this in strength and non-electric encasements.

We should not be surprised if Col. Shaffner will, before long, mount his pet and pass over to Europe, to offer his improvements to the trans-Atlantics. His energetic efforts and improvements in rendering subservient to man the fierce element, merits not only the admiration of the world, but a most fruitful reward.—*Paducah Journal.*

These are a few of the hundreds of notices of the cables crossing the Ohio, Mississippi, Merrimack, and Tennessee rivers. They have proved their efficiency. The torrents of the mighty floods roll over their powerful forms, and never in a single instance have they failed to perform their functions. We have received many letters from telegraphers, asking information upon submarine cables, and it will afford us great pleasure to give any aid in our power, tending to advance the enterprise. For near five years, amid storms, tempests, ice, and floods, we tried to conquer these mighty rivers. We feel proud in being able to enjoy the conquest.

Complimentary.—We feel very much gratified in finding the following flattering good feeling entertained towards us, from the gentlemen connected with the St. Louis and New-Orleans Telegraph Line; some of whom have been associated with us for several years past. May richer blessings crown their efforts than was ever realized by them in times gone by. Their kind co-operation in the management of one of the most difficult lines in the country, will ever be cherished by us with the warmest affection. By request we insert the correspondence:—

Merited Confidence.—The numerous friends of Tal. P. Shaffner, Esq., the great telegraph man of the West, will read the following complimentary correspondence with pleasure:—*Paducah Journal.*

Louisville, Ky., *August 1st*, 1853.

On leaving the St. Louis and New-Orleans Telegraph Company, I cannot refrain from expressing to you, and the other gentlemanly officers of the line, my profound thanks for your liberal encouragement and energetic co-operation for, and in behalf of the line.

There is no telegraph company in the United States that can boast of a more true and faithful corps of officers than this, and I cannot refrain from expressing to you in this voluntary manner my sincere acknowledgments.

Your zeal, capacity, and moral worth, I trust will always be respected as

pre-eminent, and equal to the full requirements of your station, and deserving of the same confidence you have so nobly won by your services for this company.

In resigning the Presidency of your company, I give place to one who is worthy of your confidence and esteem. Many years intimate association with Col. Tanner, my successor, has established in me an abiding assurance of his ability and integrity to serve the interest of the line with the utmost fidelity.

I leave you, gentlemen, to assume new duties in the East, called by the wishes of those deeply interested in the enterprise, though much I regret to part with you, so early after the triumphant re-election as your sole manager, by the late meeting of the stockholders.

In the hour of prosperity or adversity, weal or woe, the recollection of our past association in the fulfilment of our official relations, will be pleasant and felicitous.

With sentiments of high esteem for each, and all of you,
I respectfully bid you adieu,

TAL. P. SHAFFNER,
Late President of the St. Louis and New-Orleans Telegraph Co.

August 15th, 1853.

TAL. P. SHAFFNER, ESQ. :—Dear Sir :—We have each of us, at our respective stations, received your complimentary letter, announcing your withdrawal from the Presidency of this Company. We thank you kindly for the expression of confidence and regard for us, individually and collectively, as the corps of managers and operators on said line, and we assure you that those feelings of confidence and regard are fully reciprocated by us. Since our connection with this line, over which you have exercised a vigilant supervision, and exerted a most creditable enterprise, our intercourse with you has been one of uninterrupted pleasure. That we regret to part with you, it is unnecessary to add; but in our separation we beg you to rest assured that you have with you our warmest friendship and highest regard, and we shall ever cherish for you a most timely esteem. And with our best wishes for your future prosperity, good health and happiness, we are

Yours, most respectfully,

C. CARVILLE, GEO. D. SHELDON, *Nashville, Tenn.*
J. L. THOMAS, *Clarksville, Tenn.*
J. H. M'KENZIE, *Hopkinsville, Ky.*
E. J. MARSHALL, *Eddyville, Ky.*
SAM. B. HITT, *Smithland, Ky.*
H. B. MARSH, G. S. PIDGEON, J. B. SLEETH, *Paducah, Ky.*
W. H. BOLLARD, *Caledonia, Ill.*
M. B. HARRELL, HENRY CANDEE, *Cairo, Ill.*
HOMER PARR, *Cape Girardeau, Mo.*
JOHN M. WEBB, *Ste. Genevieve, Mo.*
F. M. COLBURN, T. E. SWEETS, *St. Louis, Mo.*

HON. AMOS KENDALL.—THE ARBITRATION.—It is known to the public, that recently an arbitration, on telegraph affairs, took place in the city of

Philadelphia. The case was one of difference between the Washington and New-Orleans Telegraph Company and the Morse Patentees, including their energetic agent, Hon. Amos Kendall. With a view of finally settling disputed points in a business affair, as to respective rights, the questions in dispute were amicably referred to three disinterested gentlemen, and their award to be final in the premises. These gentlemen were distinguished lawyers from New-York, Philadelphia and Charleston. The news reporter of Philadelphia was indiscreet enough to promulgate a slanderous news item for the press, charging Mr. Kendall with fraud, &c. The recollection of the base slander must mantle the news-reporter with shame and mortification. How a man can bring himself so low as to wantonly assail another in this wholesale manner, totally reckless of truth, is a question not easily solved. He stands behind a curtain, and is presumed to be just in his message to the world, never permitting a false statement to issue from his position. The flag entrusted to his charge, he trailed in the dust in heralding forth a fabricated statement, relative to this transaction.

With a view to place the matter before the country in its proper garb, we addressed a letter to Mr. Kendall, requesting information upon the subject. His letter nobly unfolds the bright page of truth. Here is the answer, viz.:

WASHINGTON, *Nov. 10th*, 1853.

TAL. P. SHAFFNER, ESQ.:—Dear Sir:—At your request, I proceed to state the practical results of the arbitration, lately held in Philadelphia, in which the Washington and New-Orleans Telegraph Company, Prof. Morse, the Messrs. Vails and myself were parties.

It was an amicable proceeding, in which the Company claimed that we had no right to a certain amount of stock acquired through the construction of the line, and we claimed a right to additional stock, in consequence of the putting up of a second wire on a portion of the line, which the Company denied.

Before the arbitrators entered upon the case, I called their attention to a telegraphic message in the New-York Herald, which appears to have been sent all over the Union, charging me, by name, with fraud in these matters.

The following is an extract from the award, viz.:

"*It being the opinion of the Referees, that* THERE HAS BEEN NO ACTUAL "FRAUD, and that the circumstances of the transaction are not such as to "induce the charging of these expenses on the parties in any other manner, "or to any greater extent, than they will bear them in common with all the "Stockholders of the Company."

The author of the libellous message thus finds his malice defeated by his own act, inducing an express acquittal of his charge.

Of the questions submitted, the Arbitrators decided the first in favor of the Company, and the second against them. By the first branch of the decision, Messrs. Morse, Vails, and myself are required to refund $20,000 in stock, and $2,200 in dividends; in all,..... $22,200 00

The second branch of the decision will give us additional stock, amounting to about 39,861 12

Balance in our favor,..... $17,661 12

The result in detail is as follows, viz.:

	To refund.	To receive.	Gain.
Prof. Morse,	$9,250 00	$16,608 80	$7,358 80
A. Vail,	1,387 50	2,491 32	1,103 82
G. Vail,	1 387 50	2,491 32	1,103 82
A. Kendall,	10,175 00	18,269 68	8,094 68
	$22,220 00	$39,861 12	$17,661 12

These results will, doubtless, be somewhat varied in the final settlement; but it is quite as likely that the amount accruing to us will be increased, as that it will be diminished.

I had proposed, for the sake of peace, to give up all claim to stock on the second wire, and all additional wires; but my proposition was not acceptable. If the malicious men who got up the difficulty are satisfied with the result, I assure them that I am.

There was the less reason for charging me with fraud in this matter, inasmuch as my accusers knew I was not the author of the arrangement of which they complained; but I look upon it as a compliment, that I was singled out as the object of attack. When a rogue is called a rogue, it creates no sensation; but when an honest man is charged with default, whether rightfully or wrongfully, all hell yells with delight.

With great respect,
Your obedient servant,
AMOS KENDALL.

ATLANTIC OCEAN TELEGRAPH.—We desire to say much upon this subject, but have not room in the present number. We publish an article on the Ocean-Sounding, as preparatory to a discussion of the question in future. There are several efforts being made for the construction of an electric telegraph cable across the ocean. We believe it can be done. There can be no doubt about it. This boldness we expect to be ridiculed. So were the founders of the telegraph. To our astonishment we find the editor of the *Telegraph Review*, Mr. Reid, indulging in a sneer at the enterprise. This was unexpected, although his good will towards us, has been, for a long time, deemed exceedingly questionable. We seek no controversy, nor will we permit ourselves to be drawn into one. We notice the article in the *Review*, because it is evidently intended to hinder the accomplishment of an enterprise, that is destined, ere the revolution of many years, to astound the world by its most triumphant success. Here is the article, viz:

"We now learn, that Mr. Shaffner is in concert with a former employee of an English Submarine Company, in endeavoring to form a Company to put a cable across the Atlantic. This will be a difficult work. Telegraph enterprise in this country has not been made so uniformly remunerative to stockholders, as to induce a connection with a colossal enterprise like this. The single fact of the immense weight of the cable, is enough to terrify an ordinary mind from contemplating it. The cable at Paducah weighs, at the average, of three tons per mile. The shortest stretch across the Atlantic is one thousand five hundred miles. Think of a coil, within the ribs of a vessel, weighing forty-five hundred tons! But great men are born for great necessities."

We understand this article to give the following reasons why a submarine line from America to Europe is impracticable, viz.:

1st. That it will be a difficult work.

2d. That telegraph stock in America has not proved very profitable, and that capitalists will be deterred from investing in a gigantic enterprise like this.

3d. The weight of the cable will be at least forty-five hundred tons.

4th. That no vessel is of sufficient tonnage to carry such a monster cable.

Relative to the first objection, we admit that the proper construction of an electric cable across the Atlantic Ocean will be difficult in the extreme. The crossing of the flooding waters of the inland has been difficult for years past. The same energy that has stretched a web of wire over forty thousand miles in the Western hemisphere, overland, and through its mighty streams, can master the difficulties in crossing the ocean. Tides may ebb and flow—the billows may surge with mighty power—the icebergs may tower their white mantled form, high in the skies, and sink deep in the briny sea—the heavens may let loose the loud rolling thunder, and the earth heave up its fiery lava; but, just as sure as these elements of nature exist, and worlds revolve, America and Europe will be connected by an electric cord.

To the second objection, we have to say that there is a cause for the unprofitableness of many telegraph lines. The rapidity in building, and recklessness of management, has been the progenitor of ill success. When the lines now constructed work with *fidelity*, the patronage will be sufficient to enable every line in the country to pay handsome dividends. In the construction and management of lines, apply the remedy, and the disease will be cured. Build or repair the lines strong, and insulate them well, and they will all prove profitable. Shun *extravagance* as you would a viper!

The third objection is singular, and we scarcely know how to answer it. We admit it will *weigh* very heavy; but we consider the great weight secures with it great *strength;* therefore his objection occurs to us, to be really an argument in favor of success.

The fourth and last objection is marvellous. If there was only one solitary vessel ploughing the mighty deep, then there would be something to reflect upon. After reading the objection, we proceeded forthwith to the harbor of New-York, to see if all the vessels of the world had vanished from the face of the earth. At one view we saw a forest of more than a thousand masts towering from vessels. We then felt relieved, and that all was safe. At the Merchants' Exchange, the marine registers evidenced the existence of thousands at sea, and our joy seemed to be full, that the laying of a cable need not be confined to only one poor vessel.

In the final cabling of the ocean we hope for success. We do not entertain faith in the various schemes blazoned forth in the press, but our arrangements contemplate solidity and reality.

In years gone by, Mr. Reid, with others, partook in the struggles of the telegraph. The electric telegraph was the "wonder of this wonder-teeming age," and but few entertained faith in its ultimate utility. Every person engaged in the business was ridiculed. The ignorance of that age has pass-

ed away. He who was an object of burlesque then, ought not to foster it now. The progressive march of the science ought to receive a cheering smile and not a scorn. We hope the Review will give the subject a more candid consideration.

Extension of Morse's Patent.—The subject of the extension of the patents granted to Prof. Morse, by the United States, seems to be gravely considered by a portion of the American press. Of course, no one doubts its importance to the inventor and the people. The following notice, relative to the question, we copy from the *Scientific American*, viz:—

"Extension of Patents and Patent Law Suits.—A statement has lately appeared in one of our daily papers, to the effect that a number of interested capitalists with their seat of operations in the city of Washington, have formed an association, with a capital of $500,000, for the purpose of procuring the further extension of the Woodworth Planing Machine patent, also the Hayward Patent for manufacturing india rubber, and the Telegraph Patent, granted to Prof. Morse, April 11th, 1846. The intention is to accomplish this result by a special act of Congress during its next session. There must be some error in including the patent of Prof. Morse, inasmuch as it has yet seven years to run, and the extension, if any, should be granted under our general laws. It is possible, however, that the owners of the patent anticipating its rejection by the Commissioner of Patents, are thus providing in due season to supersede the general law by obtaining a special act. To be fully convinced of this, however, we shall need more light upon the subject, but, from information received from other sources, we are led to believe that large sums of money are being collected to obtain the extension of the two first patents. We are opposed to the further extension of these patents for the following reasons:—1st. Because the applicants for the extension have already amassed enormous amounts of money from these inventions. * * * 2d. We are opposed to the extension of these patents, because they have been so managed by the owners as to injure deeply the interests of inventors, and to cause the public to become dissatisfied with our whole patent system, which is one of the most noble institutions in our country. We have always advocated the interests of inventors, and have defended their just rights; but in opposing the extension of these patents we plant ourselves upon the foundation of the rights of the people, who, as well as inventors, are deeply interested."

The editor of the above paper expresses doubt as to an association of Prof. Morse in this Company, with a capital of $500,000, but proceeds to place him with inventors, whose patents he thinks ought not to be renewed. We deeply regret this species of procedure, upon the part of the editor, to arouse "public sentiment to bear forcibly upon Congress," against the merit of the Morse patent. He ought not to associate parties in an arrangement affecting so seriously the rights of persons, unless the evidence of the fact is complete. We can assure him, that so far as Prof. Morse, or any of his friends are concerned, there is no truth in the report he has seen fit to indicate in the article quoted above. Nor has there been any grounds for the origination of so base an imputation, other than a wilful misrepresentation by some one, who has probably been foiled in his propensity to plunder from Morse those rights seemingly guaranteed to him by the letters patent.

It occurs to us, and we express our opinion with due respect, that a high

and elevated work, like the paper from which we have quoted, ought to be more careful and discriminating in assailing the reputation and property of citizens. The editor claims to be "the friend of inventors;" but we think his past career has manifested a very different disposition towards Morse. We have been often pained to see his paper joining with a part of the press in assailing the patents for the American Electro-Magnetic Telegraph.

The first objection to the extension of these patents seem to be correct, if *true*; but if not true, then a renewal ought to be granted by the commissioner. Such is the case of Prof. Morse. He has not "amassed enormous amounts of money." If he has not, the *Scientific American* ought to advocate the renewal of his patent.

The second objection is so sweeping, that we know not how to answer, so far as it may refer to the Morse patentees. We suppose, however, the objection must refer to the other patents, as there has not been any very great mismanagement of the Morse patents, unless an effort upon their part to prevent themselves from being robbed and plundered by reckless and unscrupulous speculators, be mismanagement.

The patent of Prof. Morse, granted in June, 1840, expires June 1854. That he will apply for a renewal is beyond doubt; but as to his being connected with any combinations, either direct or indirect, to procure a renewal by any corrupt mode, particularly such a base one as indicated above, is wholly untrue. The renewal can safely rest upon its merits. The laws now existing are ample for the case, and no special acts will be needed. So just are his claims, that the Hon. Amos Kendall, his agent, has positively refused to receive any aid even from those who are engaged in the telegraph business. Again we say, we are confident in the belief that no effort has been, or will be made in any manner whatever, upon the part of Prof. Morse and his associates, in procuring any act through Congress relative to his patent, or any law tending to promote a renewal.

We hope the courteous editor of that valuable work on Science, will correct the misrepresentation made, and, in future, not assail the renewal of a patent, unless he knows his first objection is unquestionably verified. *Palmam qui meruit ferat.*

NOTICE.—The Companion, and the Tariff Scale, will be published and issued from New-York City by Messrs. PUDNEY & RUSSELL, No. 79 John-street. Subscriptions can be forwarded to them, or to the Editor, at Washington City.

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Vol. I.—No. 2. FEB., 1854.

SHAFFNER'S

Telegraph Companion,

DEVOTED TO THE SCIENCE AND ART OF THE

MORSE AMERICAN TELEGRAPH.

BY TAL. P. SHAFFNER, ESQ.,

SECRETARY OF THE AMERICAN TELEGRAPH CONFEDERATION,

Washington City, D. C.

"Canst thou send lightning, that they may go, and say unto thee, Here we are!"—*Job.*

"The names of Franklin and Morse are destined to glide down the declivity of time together—the equals in the renown of inventive achievements."—*F. O. J. Smith.*

"As the inventor of the Electric Telegraph, you, Prof. Morse, stand pre-eminent."—*Arago.*

"The Electro-Magnetic Telegraph—that last and most wondrous birth of this wonder-teeming age."—*Congressional Report on Morse's Telegraph.*

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Art. I.—THE AMERICAN ELECTRO-MAGNETIC TELEGRAPH.

By Hon. Amos Kendall.

Argument submitted to the Supreme Court of the United States. Continued.

OERSTED — SCHWEIGER — ARAGO — STURGEON — HENRY — MORSE. DISCOVERIES RESPECTIVELY. MORSE THE INVENTOR OF THE RECORDING TELEGRAPH.

We propose now to take up the case somewhat in detail, and show the Court by the evidence what it was that Morse invented. First, however, it is necessary to correct some errors of fact contained in the printed argument of the opposite Counsel.

At page 7, Mr. Chase, after giving an account of the invention of the Electro Magnet by Sturgeon in 1825, says, "It was now certain that mechanical results could be produced *at any distance from the operating station* to which the Electric Current could be transmitted." No such fact is established by the evidence, nor was there any such certainty.

Again at page 28, after giving an account of Prof. Henry's experiments made known in 1831, Mr. Chase says "the fact that by the use of Electro Magnetism thus developed, any mechanical effects, capable of being produced by any ordinary motive power of like energy could be wrought *at any distance from the operating Station* to which the Electric Current could be transmitted, was also established." Again says he, "It was also established that the electric current generated by a proper battery, could be sent through a Circuit of indefinite extent *without any sensible diminution of its power to excite an Electro Magnet*, or to deflect a needle placed at the remotest point from the operating Station."

There is no evidence *tending* to establish either of these

alleged facts, other than unwarranted inference from an experiment by Prof. Henry, exhibiting a result not verified by experiment or experience, before or since. Of that we shall say more hereafter.

At page 13, Mr. Chase says, "Morse was unacquainted with electricity and electro magnetism."

It is in evidence that he attended a series of lectures on electricity and electro magnetism delivered by Prof. Dana in 1827 during which one of Sturgeon's Electro Magnets was exhibited. That identical Electro Magnet, as well as the original manuscript of Dana's Lectures, hunted up through Morse's recollection of that science as then explained by the learned Lecturer, were in evidence; but the mysterious fire in the Clerk's Office has disposed of those lectures, though the Electro Magnet is still in Court.*

At page 26 Mr. Chase says the decision of Judges Grier and Kane in Philadelphia amounts to this, that Morse was the "*proprietor of the electric current for telegraphic purposes* and that without discovering any new principle whatever."

There is no warrant for such a broad assertion either in that decision or in Morse's claims. They do not touch Wheatstone's nor any other, except *marking* telegraphs.

Page 43, Mr. Chase says "I pass, barely mentioning it here, Prof. Henry's contrivance for breaking and closing a second circuit *used in* 1833 *or* 1834, which left nothing new in point of principle to be invented by Morse or any body else for extending telegraph circuits." Nobody testifies to such use in 1833 or 1834. Henry himself, so far from testifying to *any use at any time*, is not certain that he explained it to his class before he went to Europe in 1837, and does not say that he ever did it afterwards.

Now let us see what had been done before Morse took up the subject, and in this we shall, in all sincerity, attempt to mete out *exact justice* to every one whom it is necessary to mention.

Electricity, Galvanism, sundry modes of generating them, the circuit, and modes of breaking and closing it, were known.

Oersted in 1819 discovered that the electric current, passing on the Circuit wire, would deflect a magnetic needle brought in proximity to it. This was the discovery of Electro Magnetism; a mechanical effect was then produced.

Schweiger conceived, that if the current could be made to pass several times around the needle, the mechanical effect would be increased. With insulated wire he made a coil of many turns in a shape somewhat elliptical, which he embraced in the Circuit and suspended the Magnetic needle within it. A spe-

* There is another mystery in the non appearance upon the Record of a deposition of Prof. Silliman, touching this matter.

cimen of this contrivance has been exhibited to the Court, and it is called Schweiger's Multiplier. The result was as he expected.

Arago discovered that the Electric Current passing upon a wire would attract iron filings.

Sturgeon conceived, that if a part of the Circuit wire were made to pass several times around a piece of iron, the same influence which moved the needle and iron filings, would produce Magnetism in the iron. He insulated a piece of iron rod, coiled the circuit wire spirally around it, and on applying the current, found that the iron became Magnetic. This was the invention of the Electro Magnet.

It occurred to Prof. Henry, that by applying Schweiger's Multiplier to Sturgeon's iron bar, a much more powerful Magnet might be produced. He tried the experiment and succeeded. By multiplying the turns of wire around the iron, it was found that the Magnetism was increased somewhat in proportion to the number of turns added, so that mechanical effects could be produced at greater distances on the electric circuit than with the Magnet as arranged by Sturgeon.

Henry did not invent the Multiplier, nor the Electro Magnet. His merit so far as the Electro Magnet is concerned, consists in combining together the inventions of two other men, and producing a more powerful mechanical action. He does not in his article published in Silliman's Journal in January, 1831, claim to have discovered any new principle in respect to the Electro Magnet; It is entitled "*On the application of the principle of the galvanic Multiplier to Electro Magnetic apparatus, and also to the development of great Magnetic power in soft iron with a small galvanic element*," meaning small battery.

The application of known principles in such manner as to produce an improved result, was all he claimed.

If O'Reilly and his associates had an interest in depreciating Prof. Henry's experiments, they could doubtless employ Counsel to say as has been said of Morse's invention, that this combination of Schweiger's Multiplier, with Sturgeon's Electro Magnet was "a very simple contrivance"—one so obvious and natural, that it might have occurred to anybody, and must "inevitably" have soon occurred to somebody. Nevertheless—it was an important accession to the mass of material out of which a telegraph was to be constructed.

But Prof. Henry, as he says himself, was not in pursuit of a Telegraph, or any other particular practical result useful to society. Having made his improvement, he threw it into the mass furnished by Oersted, Schweiger, Arago, Sturgeon &c., to be employed by anybody else who had the inclination to make it useful to his fellow-men. Henry's experiments were made with little more than one-fifth of a mile of wire, and although

they conclusively showed that mechanical action could be produced by means of his improvement at greater distances from the battery than was before possible, they by no means showed that it could be produced at the distance of 100, 20, or even ten miles, and especially *they did not show* that it could be produced with a sufficient force, *to mark or indent paper.*

After what has been said, written and printed, on the other side, it may surprise the Court to learn, that it was not his improvement in the Electro magnet, which Prof. Henry said in his article of 1831 was "directly applicable to Mr. Barlow's project of forming an Electro-Magnetic Telegraph," but it was the result of an experiment to ascertain the effect of currents from batteries of different descriptions, a result apparently inconsistent with all experiment and experience before and since, but in which at the time Prof. Henry seems to have had great confidence.

To place this matter in an unquestionable light, we quote the entire passage which relates to it in Henry's article in the 19th volume of Silliman's Journal, page 403, it being in evidence in this case, viz:

"Experiment 7. The whole length of the wire [over one-fifth of a mile] was attached to a small trough on Mr. Cruikshank's plan, [a battery] consisting of 25 double plates, and presenting exactly the same extent of zinc surface to the action of the acid as the battery used in the last experiment. The weight lifted in this case was 8 oz. When the intervening wire was removed and the trough attached directly to the ends of the wire surrounding the horse shoe, it lifted only 7 oz. From this experiment it appears, that the current from a galvanic trough is capable of producing greater Magnetic effect on soft iron after traversing more than one-fifth of a mile of intervening wire, than when it passes only through the wire surrounding the Magnet. It is possible that the different states of the trough with respect to dryness, may have exerted some influence on this remarkable result, but that the effect of a current from a trough, if not increased, is but slightly diminished in passing through a long wire, is certain. A number of other experiments would have been made to verify this, had not our use of the room been limited, by its being required for public exercises.

"On a little consideration, however, the above result does not appear so extraordinary as at the first sight, since a current from a trough, possesses more projectile force, to use Prof. Hare's expression, and approximates somewhat in intensity to the electricity from the common machine.

"May it not also be a fact that the galvanic fluid, in order to produce the greatest magnetic effect, should move with a small velocity, and that in pasing through one-fifth of a mile, its velo-

city is so retarded as to produce a greater magnetic action? But be this as it may, the fact that the magnetic action of a current from a trough is *at least* not sensibly diminished by passing through a long line directly, is applicable to Mr. Barlow's projent of forming an Electro-Magnetic Telegraph, and also of material consequence in the construction of the galvanic coil."

"'From this experiment,' says Prof. Henry, 'it appears that a current from a galvanic trough, is capable of producing *greater magnetic effect on soft iron after traversing more than one-fifth of a mile of intervening wire, than when it passes only through the wire surrounding the magnet.*'"

After attempting to account for a result so extraordinary and apparently so absurd, he adds, "but be this as it may, the fact that the magnetic action of a current from a trough is, *at least*, not sensibly diminished by passing through a long wire, is directly applicable to Mr. Barlow's project of forming an Electro-Magnetic Telegraph, &c."

Had this result been verified by subsequent experiment or experience, it would have saved Prof. Morse the necessity of inventing combined and local circuits, and Receiving magnets with all their delicate adjustments. And it would be a day of joy and rejoicing among Telegraphers throughout the Union, if Prof. Henry were now able to come forward with his Telegraph of a Single Circuit, *the longer the better*, running through their Register magnets, and saving the perpetual adjustment of Receiving magnets arising from the feebleness and variableness of the currents, though great improvements have been made in batteries since 1831; it would form a new era, not less distinguished than that which witnessed the introduction of the more complicated system of Prof. Morse. Unfortunately the result of this experiment turned out to be utterly delusive. The deductions of Barlow and others from previous experiments, that the magnetic force of the current diminishes somewhat in proportion to the increased length of the Circuit, became an established fact, as it is an established law of nature, and Henry's improved Electro magnet, like Sturgeon's original magnet, and the magnetic needles used by other experimenters, came under the dominion of that law, no matter what kind of battery was used, though some kinds are better than others.

These facts and circumstances show, that Prof. Henry's idea of an Electro-Magnetic Telegraph in 1831 was a *telegraph of a single circuit* based on the fallacious conclusion, that he had discovered means by which the magnetic action could be made greater with the same battery on a long Circuit than on a short one, or "*at least*" to use his own *emphasized* expression "*is not sensibly diminished by passing through a long wire.*" If this were a fact, there would be no need of combined circuits to renew the

exhausted power of the electric current. They would be but a worse than useless complication. There is, however, not the shadow of such a combination in Henry's Article of 1831, nor is it probable that then, or for a long time afterwards, his mind was directed to the means of removing an obstacle which he did not suppose to exist, particularly as his object was not to invent a Telegraph but to develope general science.

In another point of view, however, Prof. Henry's experiments were of importance. They confirmed the discovery previously made by Prof. Hare, that a current from "a trough" or from two or more plates, as in his 20th experiment, produces more magnetism in a long circuit, than a current from one plate presenting the same given surface to the acid. That the discovery was not original with Prof. Henry, is shown by his article in Silliman's Journal in which he distinctly concedes it to Prof. Hare, in his account of both his 7th and 20th experiments. Yet, Prof. Henry's experiments confirmed the discovery, and though he did not himself apply it to any useful purpose, he prepared it, so to speak, for practical application by others. It must not be forgotten, however, that this current from this kind of battery, now called a battery of intensity, though it produces more magnetism in long circuits than a battery of one pair of plates now called a battery of quantity, yet both are subject to the same law of reduction of their own magnetic influence, as the length of the circuit is increased.

It must be noted, that when Prof. Henry speaks of "mechanical action" produced by Electro Magnetism, he means any motion however feeble, such as the motion of the magnetic needle and the motion of the bar in Morse's Receiving magnet. Such "mechanical action" is wholly insufficient for Morse's purposes, and was useless to him without means to produce a much greater force.

It must also be noted, that the title "Electro-Magnetic Telegraph" is *a general name*, not confined to Morse's Telegraph, but comprehending Wheatstone's needle Telegraph, and all other Telegraphs of which Electro Magnetism constitutes the principal Agent. A force sufficient to vibrate Wheatstone's needles would be wholly inadequate to give an efficient impulse to Morse's pen. It does not follow, that when Prof. Henry or others speak of "the Electro-Magnetic Telegraph," they mean Morse's *marking* Telegraph. One kind may be practicable by an amount of magnetic force which would be wholly inadequate to give vitality to another. And of all known kinds, Morse's Telegraph requires the greatest magnetic force.

The Counsel on the other side have confounded all kinds of magnetic telegraphs together, by which expedient they give a meaning to some of the testimony which was never intended.

For instance: When Henry says that in 1831 he saw that the Electro-Magnetic Telegraph was possible, he does not mean *marking* telegraphs, which do not appear ever to have been thought of, but *signal* telegraphs which had already attracted the attention of scientific men in Europe.

This, then is the foundation on which Prof. Morse built: the discoveries and inventions of Oersted, Schweiger, Arago, Sturgeon and Henry. It was known that mechanical effects could be produced by Electro Magnetism on a circuit of considerable length, but how long was entirely unknown. Here Prof. Morse commenced his structure.

It is in evidence in the case, that as early as 1832, on board the packet ship Sully returning from France, Prof. Morse conceived the idea of his *marking* Telegraph by the application of Electricity or Electro Magnetism. He had the *result* in his mind, but he could not secure it by patent, because he had not produced it, nor could he describe a process by which it could be produced. A patent then would have been a patent for an abstract principle or result.

One portion of his means, however, was matured on that occasion, though afterwards somewhat modified, and that was his alphabet or system of telegraphic signs. Even Dr. Jackson gives him credit for that. See Jackson's letter of November 7th, 1837.

But neither could he patent that system, because he had not yet devised a plan to make them, and there was no Telegraph in existence to which they could be attached as an improvement. Though *new*, he had not yet made them *useful*. They were, however, drawn out in a sketch book fully identified in this case, but which perished in the fire which destroyed Dana's Lectures. It is in evidence, that Prof. Morse contemplated making these characters by means of an Electro-Chemical process, and that he and Dr. Jackson were jointly to make experiments after their arrival in the United States, to ascertain what solution would best answer the purpose, it being already known that if certain substances were dissolved in some liquid, and a piece of paper saturated with it, the Electric current passing through the paper would leave a visible mark.

It is in evidence, that immediately after his arrival in the United States, Prof. Morse cast certain type, corresponding with the signs or letters he had invented, which, instead of being applied to print them directly, were to be set in a port-rule in a straight line, each type representing the letter or sign intended to be printed at the distant station. These type so arranged, were then made to pass under a metallic point with which each type in its turn came in contact, closing the circuit and keeping it closed a longer or shorter time, as the type re-

presented a dot or a line. The metallic contact being broken as each letter passed, broke the circuit: at the same time the prepared paper at the other end, passing between a stylus and a metallic cylinder, both in the circuit, was to be marked with dots and lines by the chemical action of the current in correspondence with the type which closed the circuit. This contrivance was equally applicable to the making of marks by the Electro-Magnetic process; and though not in use because the operators soon learn how to regulate the requisite duration of the current by holding down the key a longer or shorter time, thereby avoiding the necessity of putting the messages in type, it might yet be employed with advantage in cases where great caution should be used to avoid mistakes.

The contemplated joint experiments of Morse and Jackson were never made, and Morse sought out separately the means of printing his characters at a distance, by means of Electro Magnetism.

In 1835 he constructed a rude machine embodying all the principles and appliances of an Electro-Magnetic Marking Telegraph by means of a single Circuit. It was just such a Telegraph as Prof. Henry supposed to be practicable from the delusive result of his experiment in 1831. But Prof. Morse was not satisfied that he could get power enough to mark at any considerable distance by means of a single Circuit. He, therefore, sought for the means of overcoming this anticipated difficulty, and he found the means in combined circuits, using the mechanical action of the first circuit, to close and break the second, and the second the third, and so on indefinitely.

Now, indeed, an Electro-Magnetic *Marking* Telegraph *was* possible and *not before*. But, let the witness, Professor Gale, tell the story. The following are extracts of his Deposition, pages 142 and 144–5 of the Record, viz:

"That in the month of January, in the year one thousand eight hundred and thirty six, I was a colleague Professor in the University of the City of New York, with Professor Samuel F. B. Morse who had rooms in the University building on Washington Square in said City. That during the said month of January of the year aforesaid, the said Professor Morse invited me into his private room in the said University where I saw for the first time certain apparatus constituting his Electro-Magnetic Telegraph.

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"It was early a question between Professor Morse and myself, where was the limit of the magnetic power to move a lever? I expressed a doubt whether a lever could be moved by this power at a distance of 20 miles, and my settled conviction was, that it could not be done with sufficient force to make characters

on paper at 100 miles distance. To this Prof. Morse was accustomed to reply, "'If I can succeed in working a magnet ten miles I can go round the globe.'" The chief anxiety at this stage of the invention, was to ascertain the utmost limits of distance at which he (Morse) could work or move a lever by magnetic power. He often said to me, "'it matters not how delicate the movement may be, if I can obtain it all, it is all I want.'" Prof. Morse often referred to the number of stations which might be required, and which, he observed, would add to the complication and expense. The said Morse always expressed his confidence of success in propagating magnetic power through any distance of electric conductors which circumstances might render desirable. His plan was thus often explained to me: 'Suppose' said Prof. Morse 'that in experimenting on twenty miles of wire we should find that the power of magnetism is so feeble that it will but move a lever with certainty a hair's breadth; that would be insufficient, it may be, to write or print, yet it would be sufficient to close and break another or a second circuit twenty miles further, and this second circuit would be made, in the same manner, to break and close a third circuit twenty miles further, and so on around the globe.'"

"This general statement of the means to be resorted to now embraced in what is called the '"Receiving Magnet,'" to render practical writing or printing by Telegraph, through long distances, was shown to me more in detail early in the spring of the year 1837, (one thousand eight hundred and thirty seven), and I am enabled to approximate the date very nearly from an accident that occurred to me from falling on the ice formed of late snow in the spring of that year. The accident happened on the occasion of removing to Prof. Morse's rooms in the New York University some pieces of apparatus to prepare a temporary receiving magnet.

"The apparatus was arranged on a plan substantially as indicated in the drawings on sheet 2 accompanying this affidavit. 1 is a battery at one terminus of a line of conductors representing 20 miles in length, from one pole of which the conductor proceeds to the helix of an Electro magnet at the terminus (the helix forming part of the conductor), from thence it returns to the battery end terminating in a mercury cup O from the contiguous mercury cup P, a wire proceeds to the other pole of the battery, when the fork of the lever C unites the two cups of mercury, the circuit is complete, and the magnet B is charged and attracts the armature of the lever A which connects the circuit of battery 2 in the same manner, which again operates in turn [on the] lever E, twenty miles further and so on.

"This I depose and say was the plan then and there revealed and shown to me by the said Prof. Morse, and which, so far as I

know, has constituted an essential part of his Electro-Magnetic Telegraph from that date, till the present time."

"It was early a question," says Prof. Gale, "between Prof. Morse and myself, where was the limit of magnetic power to move a lever." Of course, *it was early in* 1836. Prof. Morse could not tell, but he replied "*If I can succeed in working a magnet ten miles, I can go round the globe*," and he explained his plan to be the use of the first circuit to break and close a second, and so on, now called the combined circuit. And *early in* 1837, *he actually made the combination*—Prof. Morse could not have derived this idea from Prof. Henry, for the following reasons, viz:

First. He did not become acquainted with him, as appears by Henry's evidence, until late in 1837 or early in 1838. We apprehend it was really much later.

Secondly. He did not find a trace of it in Henry's article of 1831. On the contrary, that article, if he had confidence in it, must have tended to convince him that no such expedient was necessary.

Thirdly. It was never a topic of conversation between Morse and Henry, at least prior to 1839, for Henry says in his Deposition, (Record, p. 424) "I heard nothing of the secondary circuit as a part of Morse's plan until after his return from Europe, whither he went in 1838." Although at page 425, he speaks of several visits of Morse to Princeton to confer with him, they were all subsequent to 1837, about the end of which year by his account, their first acquaintance was formed. And it is worthy of remark, that, although Henry says, "I freely gave him all the information I possessed," he nowhere intimates that he had given him the least idea of combined Circuits. The reason why this combination was not spoken of by either, may be, that Henry still had faith, that with Cruikshank's battery, a battery not now in use, a current of electricity might be projected to any distance, if not with an increase "at least without any sensible *diminution*" of its magnetic "influence," and of course, did not think the expedient of combining circuits worth mentioning; while Morse believing the same thing, from Henry's information, also thought his preconceived and perfected plan wholly useless, and never mentioned it. Be that as it may, it is quite evident that the idea was not suggested by either to the other, and was probably original with both.

But an attempt is made to deprive Prof. Morse of the merit, if not the profit, of this part of his invention by a misconstruction of Prof. Henry's testimony. It is asserted that he used this very combination, and explained it to his class in 1833 or 1834. Prof. Henry makes no such statement, nor any statement justifying such an assertion. The following extract from the Re-

cord, page 42, contains all that Prof. Henry says on the subject; viz.

"In February, 1837, I went to Europe, and early in April of that year, Prof. Wheatstone, of London, in the course of a visit to him at King's College, London, with Prof. Bache, now of the Coast Survey, explained to us his plans of an Electro-Magnetic Telegraph, and among other things, exhibited to us his method of bringing into action a second galvanic circuit; this consisted in closing the second circuit by the deflection of a needle, so placed that the two ends projecting upwards, the open circuit would be united by the contact of the end of the needle when deflected, and on opening or breaking the circuit so closed by opening the first circuit and thus interrupting the current, when the needle would resume its ordinary position, under the influence of the magnetism of the earth. I informed him that I had devised another method of producing effects somewhat similar. This consisted in opening the circuit of my large quantity magnet at Princeton when loaded with many hundred pounds weight, by attracting upward a small piece of movable wire, with a small intensity magnet, connected with a long wire circuit. When the circuit of the large battery was thus broken by an action from a distance, the weights would fall, and great mechanical effect could thus be produced, such as the ringing of church bells at the distance of a hundred miles or more, an illustration which I had previously given to my class at Princeton. My impression is strong, that I had explained the precise process to my class before I went to Europe, but testifying now without the opportunity of reference to my notes, I cannot speak positively; I am, however, certain of having mentioned in my lectures every year previously, at Princeton, the project of ringing bells at a distance by the use of the Electric Magnet, and of having frequently illustrated the principle to my class, by causing in some cases a thousand pounds to fall on the floor, by merely lifting a piece of wire from the cups of mercury closing the circuit.

"The object of Prof. Wheatstone, as I understood it, in bringing into action a second circuit, was to provide a remedy for the diminution of force in a long circuit. My object, in the process described by me, was to bring into operation a large quantity magnet connected with a quantity battery in a local circuit, by means of a small intensity magnet, and an intensity battery at a distance."

It will be perceived, that Prof. Henry calls Wheatstone's Telegraph, an "*Electro-Magnetic Telegraph*," though it was a *signal* Telegraph only, which, instead of recording letters like Morse's, pointed at them by means of magnetic needles.

In a preceding part of his Deposition, Prof. Henry, after

giving an account of the results of his experiments upon the single circuit, made public in 1831, goes on to say: (page 421)

"In 1832, I was called to the chair of Natural Philosophy in the College of New Jersey, at Princeton; and in my first course of lectures in that Institution in 1833, and in every subsequent year during my connection with that Institution, I mentioned the project of an Electro-Magnetic Telegraph, and explained how the Electro Magnet might be used to produce mechanical effects at a distance."

Now, were all these lectures substantially but repetitions of his article of 1831, or did they embrace the additional idea of combined circuits, as means of effecting these mechanical results? If the latter had been the case, Henry could not so far have forgotten it, as to have any doubt whether he had explained the combined circuits to his class before he went to Europe in 1837. It is in the nature of things impossible, that if, during four years' lectures, he had described this combination of means for accomplishing an end, he should have forgotten those means while he distinctly remembers the end. While he "cannot speak positively" as to ever having explained the combined circuit to his class before he went to Europe in 1837, he says "I am, however, certain of having mentioned in my lectures every year previously at Princeton, the project of ringing bells at a distance by the use of the Electro Magnet, and of having frequently illustrated the principle to my class by causing in some cases a thousand pounds to fall on the floor *by merely lifting a piece* of wire from two cups of mercury closing the circuit." Now, this is the precise mode for closing and breaking the single circuit then used in experiments, and was *not* Henry's mode of bringing into action a secondary circuit. "This" he says "consisted," (not *in a forked wire dipped in two cups of mercury* but) in opening the circuit "*by attracting upward a small piece of movable wire* with a small intensity magnet, connected with a long wire circuit." When, therefore, Prof. Henry says he is certain of having mentioned *every year previously at Princeton*, the project of ringing bells, &c., and illustrated the principle to his class "by *merely* lifting a piece of wire from two cups of mercury closing the circuit," it is as much as to say "the piece of movable wire" was not used in the process.

The solution of this matter is perfectly easy. The short single circuit used by Henry with his improvements in the Electro Magnet, was competent to all the results he *actually exhibited*, and he *used no other*. He does not pretend that he did. His impression is, not that he *used*, but that he merely *explained* the combined circuit to his class. As to results *not* produced by him, such as ringing bells at a distance of one hundred

miles, &c., *he only inferred it* might be done, basing that inference *upon his improvements in the Electro Magnet and his supposed discovery that the magnetic action from a particular kind of battery* "is *at least* not sensibly diminished by passing through a long wire."

He could draw no other inference from this supposed fact, and if it had turned out to be a fact, he could have rung bells by a single circuit not only at a distance of one hundred miles, but of ten thousand miles, and combined circuits would never have been thought of for any practical use.

Prof. Henry does not state when he first conceived the idea of combined circuits, or say positively whether he had it at all before he saw it in operation in England, in 1837. If he explained it to his class, he certainly had it, but he is not positive as to that. If he did not explain it to his class, then it is presumable he did not have it; or considered it of no importance, for he doubtless explained to his class all he knew or thought, which he considered of any importance on the subject. All that Henry proves, therefore, is, that *he had the idea in April* 1837, saw then an actual combination by Wheatstone in London, and suggested a different mode for breaking and closing the secondary circuit. But prior to that time, Morse had not only conceived but completed the combination. It is admitted that Prof. Morse neither invented nor improved the battery. Neither did Prof. Henry. All he did in that respect was to test the capacity of known batteries in connection with his improved Electro Magnet. Nor is it any real disparagement to him, that being misled by a single experiment, he should reason that it might be "a fact that the galvanic fluid, *in order to produce the greatest magnetic effect, should move with a small velocity*," a supposition long since proved to be the reverse of the fact, as Prof. Henry's Deposition virtually establishes. Since 1831, Danielle's battery, and Grove's battery have been invented, and the latter has nearly superseded all others in the Telegraph Lines. It is composed of *cups* instead of *pairs*, and these cups generally without difference in size, are used both in the main and local circuits, so that practically in the Telegraph, the difference between what Prof. Henry calls a "battery of intensity" and a "battery of quantity" is merely the difference between a *big* battery and a *little* battery, "an *intensity* magnet" being made magnetic by a *big* battery, and a "quantity magnet" by a *little* battery; and a big battery very naturally sends out a swifter current than a little one of the same kind. But the distinctive names found in Prof. Henry's Deposition, do not appear in his article of 1831, and we regret that Science has not clearer ideas on this subject, or more intelligible terms to express them.

We feel as if we have gone into this subject with unnecessary

prolixity; for what, after all, does Henry's testimony amount to in its broadest construction, but that, in common with Oersted, Schweiger, Arago, Sturgeon and others, he has furnished some of the materials used in the Telegraph, without pretending that he produced a Telegraph, or attempted to do so?

He says himself "I left to others what I considered in a scientific view, of subordinate importance—*the application of my discoveries to useful purposes in the arts*," Record, page 424. He further says "I have always considered his [Morse's] merit to consist in combining and applying the discoveries of others in the invention of a particular instrument and process for telegraphic purposes." And if this "particular instrument and process" were the *very first* that gave to the world a *Recording Telegraph*, do they not in law entitle Prof. Morse to as full protection as if he had discovered every principle, devised every combination, and invented every particle of machinery which he employs? Patent law does not accord with the idea, that the production of useful results, is of "subordinate importance." It looks upon mere scientific discoveries as utterly useless until applied to useful purposes in the arts." Let Henry have "the consciousness of advancing science, the pleasure of discovering new truths, and the scientific reputation to which these labors would entitle him," which he says is "the only reward he ever expected,": but do not deny to Morse the reward which his country has promised him for the *more useful* if not more glorious labors, of taking in hand Henry's *barren truths*, dressing them up in the garb of utility, and sending them forth to serve and bless his fellow men.

Art. II.—MORSE'S ELECTRO TELEGRAPH.

By George Gifford, Esq.

Argument Submitted to the Supreme Court of the United States.

THE INVENTED MACHINERY—PROCESS—ART AND ACHIEVEMENT.

May it please the Honorable Court: It has fallen upon me to close the argument on the part of the appellees in this important cause, and in entering upon that duty I find myself laboring under the same embarrassment of want of sufficient time, which has been experienced by all the counsel who have preceded me. And although we thank the court for the allowance of more time for the argument than is fixed by their standing rules, yet we did believe and still believe, and after this initiatory examination of the subject, we think the court must concur with us in the belief, that still more time might have been properly and usefully appropriated to the investigation of

the vast amount of most difficult matter in this case. We are not unmindful of the other important duties of this court, nor of how great is the value of its time to the country; but we cannot avoid remembering also, how small is the value of a few days of the time of this or any other court, compared with the vast amount of time which Morse's Telegraph is daily saving to the country and world. The invention with which we have to deal in this case, is unlike those which have usually been subjects of judicial investigation by the learned members of this court; it is so, both in the agent employed and the result attained.

It employs a subtle, imponderable, invisible agent, and this, not for the manufacture of tangible things, but for the transmission of information.

It is not like the changed and varied combinations of levers, wheels, cams, cylinders, eccentrics, pinions, ratchets, and other visible parts of apparatus and mechanical fixtures, constituting improvements and inventions in the machines and devices employed in the preparation or manufacture and improvement of food, raiment, implements of husbandry, and a variety of other tangible things, by acting upon and changing the form or quality of tangible substances, wherein an occular inspection of illustrative models of wood or metal exhibits the whole essence of the invention. On the contrary, this invention is chiefly constructed of combinations, relations, and conditions far more subtle and refined, and much more difficult to be understood.

The *apparatus* and *machinery* of Morse's Telegraph, subjected here, by the aid of models, to the inspection of the court, ingenious, novel and important as it is, nevertheless presents but an humble appearance to the mind that understands and appreciates the soul of this Telegraph, imparting the mighty energy which its works alone reveal.

Nor is this power and ability a result of chance, but on the contrary it is the legitimate and designed function of a series of combined conditions and intermediate results, sustaining exact and fixed relations to each other, and though intangible, yet wrought, jointed and adjusted with more accuracy, nicety and skill than the smith displays in fitting and connecting the physical parts of his time-piece, and all indispensible to the practical control of this electric messenger, and exhibiting to an investigating mind the most refined, delicate, and effective touches of the conquering genius of the inventor.

The power of the invisible constitution of this invention is known best by its works. The unseen atmosphere in a quiesent state gives little indication of power, but when raging in the hurricane, the *effects* of this invisible agent evince its power. The body of a man gives no indication of the latent power of

reposing passion, and yet passion is the moving power of the race of men, and is known only by its works. The apparatus of Morse's Telegraph is, comparatively, simple and unostentatious; but the conditions and relations which make it a telegraph and the wonder of mankind, are intangible and invisible, and for that reason by a cursory observer, are liable to be stumbled over unappreciated. But when a feeble man, standing near a telegraph in this capitol, and by gentle touches of the finger, and within fifteen minutes, can hold converse with the remote parts of the four quarters of the Rupublic—with Maine, Louisiana, Wisconsin, and the Lakes, then it is that its inherent energies and power are exhibited in its triumphant result of intercepting time and obliterating space; and then it is that we are forced to concede that the visible apparatus is but an inadequate exponent to the Telegraph, and then we realize the necessity of a further investigation in quest of those parts and features of the invention by which, together with the machinery, it performs its gigantic feats. In this I hope to be of some service to the court. This may be thought by some to be too metaphysical, such notions, however, are not realities, but mere apologies to excuse from the labor of investigation.

As has already been stated by my colleague, limitation of time has rendered it necessary to omit comment on any minor points in this case, and for the counsel of the appellees to make a division among them of the main points submitted upon their brief, and for each to confine himself exclusively to the points within his division.

The points, on the printed brief of the appellees, cover all material matters put in issue by the pleadings in the court below, and, therefore, as we suppose, cover all that can properly be controverted here. But the extraordinary course of our learned opponent who opened the argument in behalf of the appellants, in urging his supposed right to originate here, for the first time, other issues—issues not made by the pleadings, nor heard of in the court below, and unknown to the record, and never made at all until recorded in the printed brief of the learned counsel, has given rise to certain other points appertaining to the merits of the case, the importance of presenting or omitting which will depend upon the decision of the court, on the preceding question of practice, that is, whether the appellants have a right to a tranformation of this court into one of original jurisdiction in this case, and to so frame new issues to be here tried for the first time. This question of practice fell within the division of my learned colleague, who we think, without much effort, has successfully maintained the negative of such a proposition.

And although the appellees would have had nothing to fear

from the matters involved in any such new issues, now here made and insisted upon by our learned opponents, had such issues been made in the tribunal where they could have been met by the proper testimony, yet they do protest against the right of the appellants to now and here, for the first time, present new issues involving questions of fact, which in whole or in part can be determined only by testimony; and to do this at a stage of the controversy, and in a court where new testimony cannot be offered; and they protest against this proposition as being without precedent, and contrary to the rules and practice of this court. Still, as we cannot, with entire certainty, anticipate the conclusion of the court on this question of practice, and as evidence taken with reference to other issues can be gathered from the record sufficient to meet and negative even the propositions of our opponents, founded on these new issues, we have resolved to not leave them entirely untouched, but to give them such attention only as may be consistent with a more full consideration of the other issues which were made in the court below, and which we regard as the only questions properly before this court.

Of these new issues it falls to me to consider only those involving questions made upon the re-issuing of Morse's patents, the others fell into more able hands, and have been disposed of by my colleagues.

The questions appertaining to the merits of the case properly before the court, and all, as we submit, with which they will find it necessary to tax their attention, are recorded in our brief, and have been referred to and re-stated by one of my colleagues, and it will be unnecessary for me to recapitulate them here; suffice it for me to remind the court that those falling within my division are:

1st. The patentability of the subject matter of the 1st, 5th and 6th claims of the patent of 1840, as re-issued in 1848.

2d. The patentability of the subject matter of the patent of 1846, as re-issued in 1848, in reference to its relation to and difference from anything included in the patent of 1840.

3d. Infringement.

4th. Disclaimer.

After disposing of those points, then, if time will permit,

5th. To briefly examine the new questions raised by our opponents, as to the validity of the several re-issues of the patents.

The principles of law which these points involve are so well settled, and are so familiar to this learned court, as to require no parade or exhibition of authorities and cases to maintain them. It will be more useful to dwell upon the relation between the facts and the law.

Before taking up these points in their order, and preparatory

to a consideration of them, it will be important to pause and look into the vital parts of the invention of Morse's Telegraph.

No safe conclusion can be arrived at as to whether the claims of a patent for an invention are proper or improper, or whether, and in what there has been an infringement, unless the invention be subjected to an examination sufficiently searching to determine both its *quantity* and *kind* of novelty; for as well might one attempt to decide upon a question of trespass upon land without knowing its boundaries, or how far the title of the claimants extended.

To follow the course of the inventor's mind, and make such an examination of many, and indeed of most inventions, is an easy task, while others require the exercise of the best faculties of the mind, and the most enduring patience.

Many inventions consist only of a single combination, and that too, of tangible parts of apparatus or machinery, where a slight inspection will possess the mind of all there is of it; others consist of many combinations, and are of a compound character, and therefore more difficult to understand; but the combinations of which, still being limited to parts of tangible apparatus or machinery, can easily be understood from a more careful ocular inspection. But, there are still others consisting, not only of many combinations, but of many classes of combinations; one class consisting, perhaps, of combinations in apparatus or machinery; another class of combinations of motions; another class of combinations of intermediate results; another class of intermediate conditions, and finally involving the combination together of the several classes, constituting a complicated whole, in which every element of each class or an equivalent is an efficient and important agent in attaining the ultimate and designed result of that class, and in which also such ultimate result of each class of combinations forms either an indispensable intermediate condition, or effect in attaining the final result of the whole, or an indispensable component part of the whole combination.

Inventions of this last character are, of necessity and from their nature, most difficult to understand—and such, too, bringing out great and useful results, are the ripest fruits of the longest and most indefatigable efforts of the greatest and most enduring genius; and if genius be not absolutely necessary to even understand them after produced, it is certain, that, at least, a careful, patient, and sometimes long and tedious investigation is necessary; and if any one, called to limit the magnitude of such an invention and define the merits and rights of its author, and to find division lines, and to fix the boundaries thereto, content himself with only a cursory inspection of the

visible parts of the clothing of the invention, without a patient examination of the parts which enter so vitally into its life and principle, and give it energy, efficiency and utility, he may be expected to be and remain, where he commences, upon the surface of the thing, unconscious of the grandeur, beauty and order displayed in the superstructure below; and in such case, too often, it would be by mere accident if the response to the inventor's call for protection and justice be more than an unintentional slander upon his merits and his invention. We congratulate the inventor of Morse's Telegraph, that, although the spring and summer of his life have been spent in the philanthropic work of his invention, amid alternate hopes and fears, he has lived to be present and see his invention and cause submitted to this Supreme Tribunal of his country, whose duty and desire to reward merit by justice will overrule every consideration of personal inconvenience and arduous labor, necessary for such full, ample and elaborate examination as will exclude all danger of a misapprehension, or a misunderstanding of the nature, character and extent of his invention.

Morse's telegraph partakes of three distinct classes of patentable subject matter; 1st, *apparatus or machinery;* 2nd, *process;* and 3d, an *art;* each of which, independently of the others, is a fair and perfect subject, within the law, for a patent, and any of which might have been patented without patenting either of the others, but all of which in this case, and properly too, are patented.

It will be found, on attaining familiarity with the details of Morse's invention, that it is not a want or scarcity of novelty which renders it difficult to be understood, and difficult to fix the limits of his right, but that, on the contrary, this results from the greatness of the amount and the diversity of novelty included in it.

If Morse's invention consisted only of novel apparatus, or only of a novel process, or only of a new art, then it would be comparatively easy for the mind to embrace and identify it, and then there would be less danger of injustice to the inventor from any omission or mistake. As it is, however, it is a severe task to become so familiar with the many things about the invention, and the character of the objections raised to Morse's rights, as to avoid error in conclusion. We hear it said by some that Morse is undoubtedly the inventor of his peculiar apparatus or machinery, and *ergo*, not of a process or art; by others that he is unquestionably the inventor of his peculiar process, and *ergo* not of the apparatus or an art; by others, that he is the inventor of a new art, and that it is no matter as to the process or apparatus; by others, that he is evidently the inventor of the process and apparatus, and could not be of an art; by

others, that he must have been the originator of the art and process, and *ergo*, it is of no consequence about the apparatus; by others, that he may have discovered the art, but could have invented nothing but the machinery.

Now, one difficulty appears to be, that all of them are right in part and all wrong in part; they are all right in their premises, as far as they go, but are all wrong in their conclusions; they content themselves with erroneous conclusions, somtimes from inability to comprehend others, and sometimes from a want of patience to investigate, either of which, in the end, exhibits the same error and mischief.

It does not follow, that because Morse's Telegraph contains many points of novelty within one class of patentable subject matter, that it may not, or does not also partake of other distinct classes of patentable matter. The fact is, that Morse's invention contains novelties of each class; that is, in machinery, process, and art; and it were monstrous if the magnitude of the invention were allowed to diminish instead of enhancing acknowledged merit. Nor does it follow that he has no right to *claim* and *patent* the novelties of each class because there are others in other classes, nor because of the still additional novelty of the several classes being combined as a whole.

Under the first point which I am to discuss, I desire here, as a means of developing the magnitude of Morse's invention, and exhibiting the rich treasures of his genius, to present four views in relation to his telegraph.

1st.—Preparatory to a due appreciation of the means, I will briefly notice the nature and character of the specific objects to be attained by it.

2nd.—I will next submit an analytical view of the component parts or elements of the process.

3rd.—I will endeavor to present a like view of the essential character of the machinery, or physical parts of the invention.

4th.—I shall attempt, and, I sincerely believe shall be able, to demonstrate that Morse's Telegraph embraces within it a new and patentable art.

To be continued.

Art. III.—THE ANCIENT AND MODERN TELEGRAPH.*

SENTINEL TELEGRAPH—FIRE PILES—INDIAN RUNNERS—CARRIER PIGEONS—TELESCOPES—CANNON REPORTS—ROCKETS—ELECTRIC—ELECTRO-MAGNETIC.

"Canst thou send lightnings, that they may go, and say unto thee, 'Here we are?'"—*Scripture.*

It is even so. The inquiry has been answered in one grand and magnificent sense. The querist and man of patience little dreamed, when using this grand metaphor to give greater effect to his reproach, and to illustrate the power of Omnipotence, that he was but uttering a eulogy upon science, while he claimed for the Deity but an attribute within the province of mortal triumphs and mortal genius. "Canst thou send lightnings, that they may go, and say unto thee, 'Here we are?'" That restless and ambitious thing, the human mind, undeterred by the subtlety of divine themes, or the awfulness of ethereal problems, has boldly pushed investigation throughout the domain of electrical phenomena, and fettered the hoary potentate of storms on his very throne. Nay, it has torn away the sceptre of the fierce god, sequestered the elements of his realm, and tamed the spirit of tempests to do the weak bidding of man. Science in this has surpassed itself. It has not only accomplished a prodigy, but has worked a miracle—a miracle so vast, so incomprehensible, that the age, much as it has advanced in knowledge and enlightenment, cannot compass the extent of the discovery to which it has given birth. The lightnings have been trained to utter the language of men! Can we conceive of anything more sublime or grand? more thrilling or lofty in the field of imagination? We aspire in our arrogance to count the suns and planets within the visual range; explore the scope of the physical heavens; transfer light and revealed darkness to canvass; imitate the works of the Creator in senseless stone; compress air into dense and powerful bodies; generate a motive agency from water; follow comets and blazing heralds through trackless wastes; and knowledge and science in these pursuits have acquired immortal honors. But what is all this to subjugating the lightnings, the mythological voice of Jehovah, the fearful omnipotence of the clouds, causing them in the fine agony of chained submission to do the offices of a common messenger—to whisper to the four corners of the earth the lordly behests of lordly man!

* From De Bow's Review.

But for the present, we shall treat of only one branch of the subject.

Telegraphs were doubtless invented coeval with the institution of society, or the organization of communities. In primeval days, sentinels stood upon the house-tops, and by gestures and postulary signs, communicated the intelligence with which they were charged. Messages were conveyed long distances by means of trumpeters stationed on contiguous hill-tops, who by minding certain tones from their instruments, could readily and intelligibly convey their tidings from place to place. When intelligence of a peculiar character was desired and expected, piles of combustible matter were prepared on elevated points, and watchmen appointed to guard and light them at the appointed signal. *Clytemnestra*, in the Agamemnon of *Æschylus*, gives us a beautiful description of these journeying telegraphs. The watchman of the tower has nightly scanned the horizon for ten long years, in vain to catch the gleam that is to announce the fall of Ilion. At last it comes:—

A gleam—a gleam from Ida's height,
By the fire-god sent it came;
From watch to watch it leapt, that light,
As a rider rode the flame.
It shot through the startled sky,
And the torch of that blazing glory
Old Lemnos-caught on high,
On its holy promontory.

And it sent it on, the jocund sign,
To Athos, mount of Jove divine,
So that the might of the journeying light
Skimmed o'er the back of the gleaming brine;
Faster and farther speeds it on,
Till the watch that keep Macistus steep
See it burst like a blazing sun!
Doth Macistus sleep
On his tower-clad steep?

No! rapid and red doth the wild fire sweep:
It flashes afar on the wayward stream
Of the wild Euripus, the rushing beam!
It rouses the light on Massapion's hight,
And they feed its breath with the withered heath.
But it may not stay,
And away—away—
It bounds in its freshening might, &c., &c.

Another mode of telegraphing was by employing fleet runners, who bore despatches with almost incredible celerity. The monarchs of Mexico were noted for their corps of Indian messengers, who were able by co-operating together, to carry a message a distance of two hundred and fifty leagues in a day. Primitive European nations had legionaries, who, with elevated spears, sent tidings afar; and succeeding generations substituted the telescope, the mirror, the cannon, and the carrier pigeon.

Rockets came later, then the post-boy, and finally the wooden structures, which may yet be found in many parts of Europe, and which, in some respects, bear a close similarity to the wind-mill edifices against which Don Quixote expended so much fruitless ire and aggressive valor. The post-coach, however, despoiled these inventions of much of their importance and utility. Carrier pigeons were wholly dispensed with; rockets were tossed out of the civil community into the military ranks; the modern colossus, with its ponderous arms, was deemed indispensable only in extraordinary emergencies, or for marine purposes; the telescope was valued only for discerning objects at a great distance, or was turned over to the use of philosophers; by common consent, the mirror was awarded to the ladies, and became, if not their exclusive, their chief source of delight; and whatever other modes of telegraphing remained, if any, were allowed to become obsolete, or were consigned to oblivion. Science had been active in its researches; and discovery led to discovery, until at length the world was "startled from its propriety" by the introduction of the steam engine and the railway, those stupenduous revolutionizers, that are fast linking, in indissoluble ties of fraternity, nation with nation, and interest with interest, until, anon, in this iron embrace, they "shall know war no more."

But science had yet to achieve a greater, may we not truly say its greatest triumph? It has been so since the application of the mind to the investigation of great subjects, that in solving an intricate problem, we find that the secret is also the key to the solution of another; and this progress in mental conquest demonstrates the necessity of new and untried instruments for the hand. On this basis, or by this parity of reasoning, we naturally arrive at this conclusion: that without genius, science would be powerless; without science, ignorance would predominate over knowledge. We are apt to marvel, that in this nineteenth century so many profound truths in philosophy, and secrets in art, have been brought to light, compared with what has been divulged or discerned during the past centuries; but let us not forget, that a fragmentary knowledge of our new electric telegraph had existed in the human mind for hundreds of years; it needed only a master mind to unite the elements; a master hand to forge the mechanical instruments, to show to the wondering world the perfect work. And, as one impediment is overcome, all other obstacles are easily surmounted. The art of expressing thought with types, perhaps, suggested the idea of conveying to the eye images of nature in print from modern blocks. It may be, that the optician, in attempting to improve the focal powers of spectacles for the eye, was moved to conceive the idea of the telescope. But what suggested the spectacles,

if not some previous effort of the mind to unlock the secrets of science, and which mechanical skill turned to permanent and valuable good?

The first telegraph constructed on purely scientific principles, was an instrument closely resembling the common telescope now in use. The author of the invention was Robert Hooke, a philosopher of the seventeenth century. Hooke, however, furnished no system of signals with his instrument, and he died disappointed in finding that his genius had attracted so little attention. But the attempt, abortive, as it had been, to supersede the modes of telegraphing in vogue by some new and untried method, stimulated the philosophers of Germany and France to employ their inventive faculties to the same end. Four years after the death of Hooke, William Amentons, a Frenchman, of Lisle, brought forward a plan, the details of which he had plagiarized from Hooke; but the principal feature, and that for which he claimed originality, was the table of characters which accompanied it. This table contained the letters of the alphabet, and a key explained to the operator the signs or signals that expressed the sense of the letters, or any combination thereof. Persons stationed at appropriate distances along a line or route, could despatch messages with considerable facility by this invention. But Amentons came to Paris at a wrong period. He laid the result of his labors before the royal court; but it was a time when vice and debauchery held undisputed sway there—when virtue was jeered at from the throne to the peasant, and genius was left to neglect and starvation. Amentons was not more successful than Hooke had been.

But science was not to be deterred from its great purpose, despite the ridicule of royal concubines. Marcel next stepped into the arena of discovery; then Linguet, Dupuis, Edgeworth, Bergstratter, and a host of others of less pretensions. Marcel pined and labored in poverty, and died without reward in obscurity, cherishing his fond project to the last. He aimed to perfect his scheme before he divulged it to the world; but failing to incite confidence, and obtaining no succor with which to prosecute his studies, he burnt his designs, buried his secret, and "wrapping his cloak about him, brooded in silence and despair, until relieved of his burden of life," which event happened soon after. Linguet had little to lose, and everything to gain by a discovery. He was at this time, and had long been, an inmate of the Bastile, and perhaps after all, his pretension was a *ruse* by which to obtain his liberty. He, however, asserted that he had invented a telegraph which would supersede all others, and proposed to exchange the secret for his enlargement. It is not known whether government ever paid any attention to the inventor; at all events, his plan, whatever it was, never enlisted

the encouragement or patronage of any one. Edgeworth put forward greater claims than all his predecessors or contemporaries; but meanwhile the German philosophers had inundated Europe with every variety of plan and design of telegraph, so that it would be difficult to particularize in what Edgeworth had been original, or what he had borrowed without credit from his rivals and competitors.

Claude Chappe, a French theological student, of Angers, "who was," according to a living writer, "so indolent that his parents thought him fit for no other profession than the church," was the originator of the telegraph which still bears his name. His brothers were at a school three leagues distant, and Claude had frequent occasion to communicate with them; but he most heartily detested the journey which he was compelled still to undertake before he could reach them. One day he set about cudgeling his brains how to obviate this difficulty. The result of many experiments was the invention of the upright post, re-revolving beam, and circulating arms—those frightful wayside giants which are still to be seen whirling and striking, and gyrating, and rioting in many parts of the Old World. Chappe was inspired with a new idea at the success of his plan. He cast aside his indolence, and began a series of experiments, the fruits of which have made his name illustrious. As soon as he had improved and systematized his scheme, he repaired to Paris, and explained its principles and operations to the republican assembly. This was in 1792. France was at war with the great powers, and early intelligence was of the first importance to the authorities of the capital. After an official trial, his project was highly approved, and himself dubbed *Ingénieur Télégraphe.* The first message this telegraph conveyed to Paris, was the announcement of the surrender of Conde to the Republic. France then wholly adopted the system, and placed the brothers Chappe in the office of general superintendence.

When we come to consider the necessities of speedy deliveries of intelligence in our present day—the augmentation of commercial and maritime interest—and the increased importance of despatch in every department of political and social intercourse—it seems impossible that we can put too high an estimate on the electro-magnetic telegraph discovery. National and individual interests, half a century since, might not have required the employment of a more active agency than the horse-express, or the post-coach; but the steam vessel and the steam carriage have brought nations together, and consolidated states, and it is as expedient that continents should now be traversed in an hour, as fifty years since the same distance should not consume more than two months.

Electricity—that wondrous power which has succumbed to

the will of man—has two essential properties, both of which have been tried for telegraph purposes; but for a period of two thousand years the skill of man was baffled in determining the distinct nature of these two properties, and in what manner to bring them separately or in combination under control. Thales, the philosopher, and founder of the Ionic sect, discovered, six hundred years before the birth of Christ, that Greek amber, when rubbed, exhibited certain properties of attraction which it did not otherwise possess. Thales, however, was too intent on mathematical problems and astronomical calculations to pay much attention to what may have appeared to him an insignificant phenomenon. Besides, it was an age grossly lax in the pursuit of scientific studies. Science was taught, but it was the science of philosophy, and not of art. It was an age when men reasoned from dogmas and abstractions, not from sound theories and natural objects. Electrical phenomena were not unknown to the scholars that succeeded Thales, either in Greece, in Asia, or the islands of the Mediterranean. But no schools, then established, incorporated the study of this branch of philosophy in their classics, and no attempt was made to inform the understanding on a subject which embraces themes the vastest and profoundest of any explanatory of the physical creation. Plutarch, Pliny, Cæsar, Aristotle, Theophrastus, and others, eminent scholars of antiquity, relate that they have seen electrical phenomena of the most marvelous and unaccountable character, but they have purposely omitted details, owing, without doubt, to their ignorance of the subject; and, indeed, they do not seem to have taken even ordinary pains to master this defect.

It was not until near the close of the sixteenth century that the nature of electrical phenomena began to be understood. A German, by the name of Gilbert, published a work entitled *The Magnet*, in which all the then known properties of electricity are treated together, with some observations on the earth and air. Of course, the wildest conjectures are here put forth as sober axioms, while many since ascertained truths—in fact, the primary principles themselves—are unceremoniously dismissed. Gilbert's work, although an embodiment of errors and absurdities, had the good effect of inducing the philosophers of the age to think. Institutions of learning were springing up everywhere, and rare minds, well stored, were leaving the cloister and academy, prepared to expound and instruct, and to contend for those prizes which the ancients had disdained to touch. Halley was the most prominent of these, who succeeded Gilbert; while Halley in turn was soon to be eclipsed by Otto Guerike, a Prussian, who constructed an electrical machine which consisted of a sulphur globe, made to rotate by means of a winch; and with this simple apparatus, and a cloth pressed

against the globe, he discovered the existence of a controllable electric fluid, and that this electric fluid could be made to pass from one body to another without actual contact. This was a grand and sublime discovery. It was the first real step toward the final establishment of the electro-magnetic telegraph.

MUSINGS OF A TELEGRAPHER.

BY GEO. G. W. MORGAN.

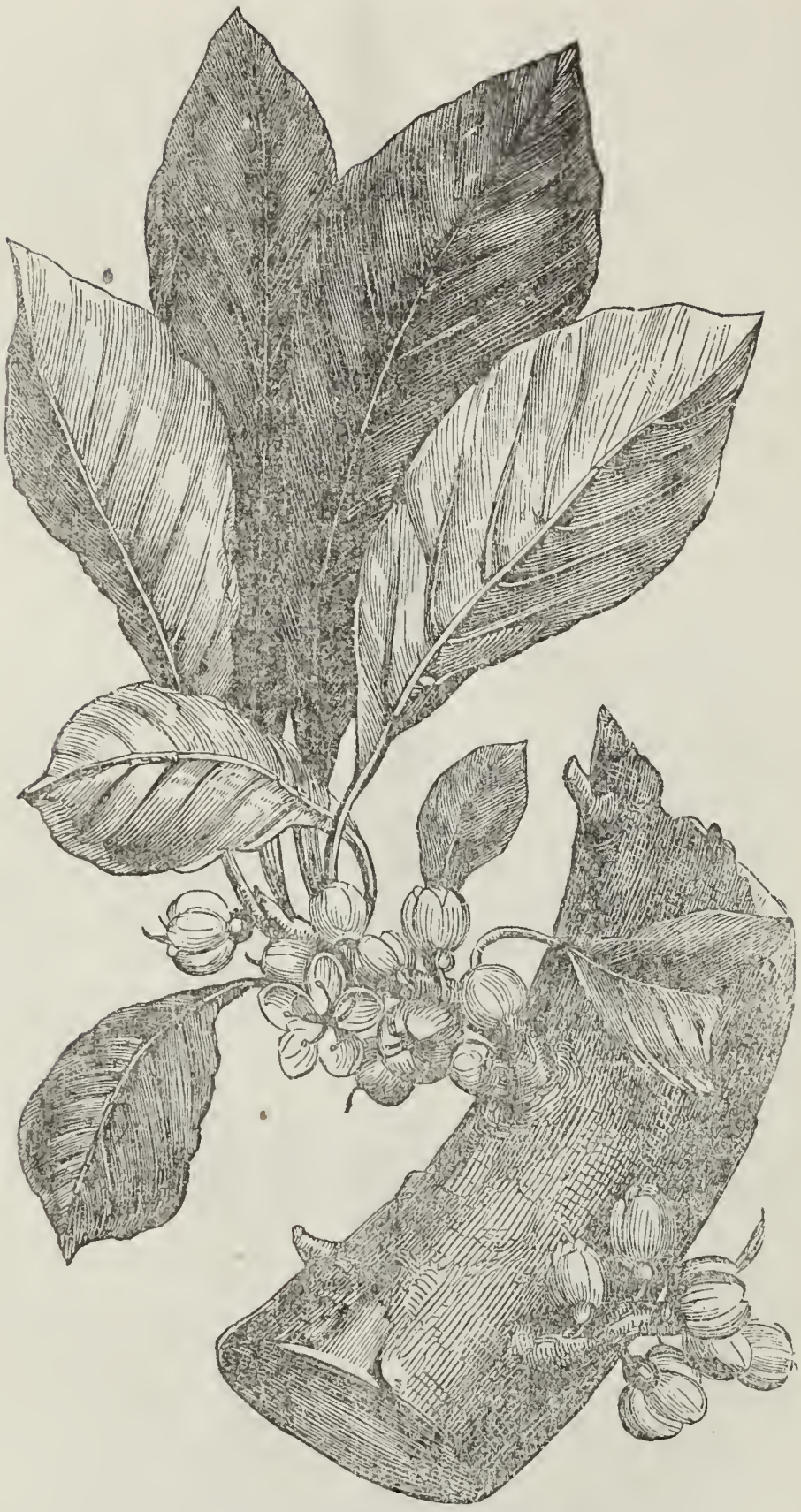
Oh, man! how graciously on thee has Heaven
  Bestowed its varied gifts to make thee blest;
Each element of earth to thee is given,
  The visible and latent; amongst the rest,
The Telegraph, e'er willingly to pay
Its service—[Sir, we aint at work to-day.]

What hope! what joy! each day to thee is known,
  Whilst space, a captive, bound, is at thy door,
Brought from the Frigid or the Torrid zone,
  To yield his tribute and increase thy store,
And backward flies the tyrant to his zones—
"[Is any answer here for Mr. Jones?]"

Speedy o'er earth and sea, 'mid frost and cold,
  And forests where the untamed brute is free—
No slave of man has ever toiled for gold
  With half the zeal that it has toiled for thee—
Asking slight tribute for the service made—
"[To send this South, sir, it must be prepaid.]"

Affection, Friendship, Love, a mighty debt
  Owe to this willing, never-failing slave.
"All safe and well—pray, write me; don't forget."
  "Father is sick—I fear too sick to save"—
"Wife's got a bouncing boy." All in a breath.
Well, such is life, or rather Life and Death.

Oh, Commerce, thou art blessed; to days gone by—
  No power now can hold thee in its chains;
Unfettered hence thine outspread wings may fly,
  And at thine ease can coolly count thy gains.
"Please stop my goods, for Buncombe this day failed."
Oh, dear; oh, dear; these Com's must all be mailed.



[Leaf and Fruit of the Gutta Percha Tree.]

Art. IV.—GUTTA PERCHA.

ITS DISCOVERY—NATURE—QUALITIES—COMPARED WITH INDIA RUBBER—CHEMICAL PROPERTIES.

Gutta Percha—the Malayan term given to a concrete juice taken from the Isonandra Gutta Tree—is indigenous to all the Islands of the Indian Archipelago, and especially to the Malayan Peninsula, Borneo, Ceylon, and their neighborhoods,

where are found immense forests of this tree, yielding this product in great abundance. Its fruit contains a concrete edible oil which is used by the natives with their food. The gutta (or juice) circulates between the bark and the wood of the tree, in veins whose course is distinctly marked by black longitudinal lines. The natives were originally in the habit of felling the tree when they required a supply, but have been taught by experience that the juice can be obtained by cutting notches at intervals in the trunk, and save the life of the tree for future tappings, as our maples for successive years yield their sap to the sugar manufacturers. The juice consolidates in a few minutes after it is collected, when it is formed by hand into compact oblong masses of from seven to twelve or eighteen inches in length by four to six inches in thickness, and these when properly dried, are what is known as the Gutta Percha of commerce.

It is only ten years since the knowledge of the existence of this ductile secretion dawned upon the world. Dr. Montgomerie, an assistant surgeon at Singapore, observed in the possession of a native, the handle of a wood-chopper of such singular material that it awakened his attention, and on inquiry and examination he found it to have been made of the juice of this strange tree,—becoming plastic when dipped in hot water, and when cold regaining its original stiffness and rigidity. Within this brief period, the exudations of these dense forests have assumed, more especially in England, innumerable forms. It is singular indeed, that there should circulate in the veins of the primeval forests of Malacca and the neighboring Isles, a sap or juice so long a stranger to the civilized world, possessing such extraordinary virtues, and in the short period of ten years entering so largely and variously into the service of man, and destined to become his servant in a greater variety of forms than any other material yet discovered.

The Gutta Percha of commerce is of a light brown color, exhibiting a fibrous appearance, much like the inner coating of white oak bark, and is without elasticity. When purified of its woody and earthy substance, it becomes hard, like horn, and is extremely tenacious; indeed its tenacity is wonderful. Mr. Burstall, of Birmingham, refering to some experiments testing the strength of tubes composed of this material, says:—"The tubes were 3-4–inch bore, the material 1-8 thick. They were tested by the Water Company's proving pump, with its regular load of 250 pounds to the square inch; afterwards we added weight up to 337 pounds, and I wished to have gone to 500, but the lever of the valve would bear no more weight; we were unable to burst the pipe." Another gentleman, Mr. Andrew Robertson, of Stirling, says:—"I am of opinion that no other material is so well fitted for the above purpose (ex-

tinguishing fires and watering the streets in dry weather,) as Gutta Percha; for, although our pressure is perhaps the great- in the Kingdom, being upwards of 450 feet, not the slightest effect could be discovered on the tube or joints, while the same pressure on our leather hose sends the rivets in all directions."

The application of heat to this crude material makes it soft and plastic, and in a temperature of about 200 degrees it becomes quite ductile, when it is capable of being molded into any desired shape, which it will retain when cool. It can be dissolved by Sulphuret of Carbon, or Chloroform, or if immersed for a time in spirits of turpentine. It is repellant of and completely unaffected by cold water, but is softened and made adhesive by warm water. It is a *non conductor of heat* and electricity; is proof against alkalies and acids, being only affected by the sulphuric or nitric in a highly concentrated state; while the most powerful acetic, hydroflouric or muriatic acids, or chlorine have no perceptible effect upon its structure or capabilities. This gum has qualities entirely differing from the India Rubber. It cannot be worn out. It can be melted and remelted, and repeatedly remolded, without changing its properties for manufacture or losing its virtue. It is lighter than rubber, of finer grain, and possesses certain repellant properties unknown to that material; and is extremely tough. It disregards frost, and displays remarkable acoustic qualities.

In its crude state, Gutta Percha has no resemblance whatever to India Rubber in appearance, nor are its chemical or mechanical properties the same, nor does the tree from which it is taken belong to the same botanical family, or grow in the same latitudes or soil; yet, from the fact that it could be dissolved and wrought into water-proof wares, many have inclined to the belief that the two materials are identically or nearly the same.

Gutta Percha when immersed in boiling water, contracts in bulk.

India Rubber when immersed in boiling water, expands, and increases in bulk.

Gutta Percha juice is of a dark brown color, and consolidates in a few moments after exuding from the tree, when it becomes about as hard as wood.

India Rubber sap is perfectly white, and of about the consistency of thick cream, when it coagulates, it gives from four to six parts water out of ten; it may be kept like milk, and is frequently drank by the natives.

Gutta Percha first treated with water, alcohol, and ether, and then dissolved with spirits of turpentine and precipitated, yields a substance *consistent with the common properties* of Gutta Percha.

India Rubber similarly treated, results in a substance resembling in appearance the Gum Arabic.

Gutta Percha by distillation yields 57 2-3 per cent of volatile matter.

India Rubber by the same process yields 85 3-4 per cent.

Gutta Percha in its crude state, or in combination with other materials, may be heated and reheated to the consistency of thin paste, without injury to its future manufacture.

India Rubber if but once treated in the same manner will be destroyed and unfit for future use.

Gutta Percha is not decomposed by fatty substances; one application of it is for oil vessels.

India Rubber is soon decomposed by coming in contact with fatty substances.

Gutta Percha is a non-conductor of cold, heat and electricity, and, in its natural state, is non elastic, and,with little or no flexibility.

India Rubber is a conductor of heat, cold, and electricity, highly elastic and flexible.

The specific gravity of Gatta Percha is much less than that of India Rubber,—in proportion as 100 of Gutta Percha is to 150 of India Rubber.

Chemists, who have analyzed them, vary a little as to their chemical proportions, but all agree, that the chemical properties and mechanical action of Gutta Percha and India Rubber are so entirely distinct and dissimilar, that they should never be classed under the same head, chemically or mechanically any more than commercially.

M. Arppe, a celebrated German Chemist, says Gutta Percha differs in composition from Caoutchouc, and that the products of dry distillation of Gutta Percha are different from those of Caoutchouc. He considers Gutta Percha to be a mixture of six resins, which have been formed from a Carb-Hydrogen.

Art. V.—ANCIENT AND MODERN HERALDRY.

NUMBER ONE.

EARLY HISTORY—ARMORIALS—GREAT SEAL OF MAINE, NEW JERSEY, VIRGINIA, SOUTH CAROLINA, KENTUCKY, MISSOURI, UNITED STATES—TELEGRAPH CONFEDERATION—KNIGHTS OF THE ROUND TABLE—HOSPITALERS—TEMPLARS—ST. ANDREW'S CROSS—ST. GEORGE'S CROSS—ORDER OF GOLDEN FLEECE.

Many of the Electric Telegraph lines of America have adopted peculiar heraldric seals, dies or stamps, representing their individuality, upon their official envelopes or message-heads. With a view to be in unison with the majority of the lines in this matter, we have gotten up a seal for the general Confederation, and we propose to give an account of the origin of its heraldric symbols, with their meanings.

We had another object in view in having engraved the seal above mentioned, viz.: Many lines were unwilling to believe that arrangements of the Secretary could effect or procure envelopes as well embossed as the respective companies could themselves. The seals of the Confederation excel anything of the kind ever gotten up before, and the impressions, embossed, will doubtless convince the lines, that the Secretary can not only equal pre-existing arrangements of companies in this particular, but excel them. It will be perceived, that the most splendid dies can be made through the arrangements of the Secretary, and the most antique and scientific armorials, known in the science of Heraldry, properly grouped and delineated on the dies. We now proceed to discuss the subject of Heraldry generally.

We learn from the science of law, that it has been a custom from the earliest ages of the world, for the people to have and enjoy various devices, signs, and marks of honor, designed to distinguish the great and noble from the common or ignoble. In Homer, Virgil, Ovid and other ancient authors, we find notices of these customs, and that heroes on the battle-field had figures of different kinds, but, of their own device, represented on their shields, whereby they might be distinguished one from the other, as well as from those of a lower order of warriors. This custom was the origin of using the shield and device thereon in armorial life, and even at this day they are prominent features in heraldric science. From the earliest ages to the present time nations have adopted symbolical signs as marks of distinction, indicating the nation by a flag, on which was illustrated their peculiar symbolic representation. The flag

of the Athenians had on it the figure of an owl, the Goths a bear, the Egyptians an ox, the Romans an eagle, the Franks a lion, and the Saxons a horse. In modern times we see the custom adhered to with equal desire among nations: — thus on Great Britain's flag is represented St. George's and St. Andrew's cross; Mexico, the eagle, the serpent and the cactus; and the United States, the eagle, stripes and stars. These symbols are peculiarities of the respective nations, and the recollection, or sight of them, in the hour of peace or war, infuses into the people a pride and glory for the brilliant renown which may characterize their own dear flag.

Symbolic representation has not been confined to the earliest and modern ages of the civilized world, but we also find it among the customs of the North American Indians. We have seen the otter as the emblem of the Ottaway tribes of Indians, the wolf, the bear, the turtle, and other devices the adopted emblems of the Iroquois and other tribes. They paint them on their bodies, and represent them as a species of idols.

An author supposes, that in Europe the Crusades and tournaments were the cause of methodizing and perfecting into a science the various national, family and individual emblems, to which was given the name of *Heraldry;* a term which embraced originally not only all that pertains to *Coats of Arms*, but also to the marshalling of armies, solemn processions, and all ceremonies of a public nature. Is is also supposed, that the term, *coats of arms*, originated from the circumstance that the ancients embroidered various colored devices on the coats they wore over their armor. Also, those who joined the Crusades, and those who enlisted in the tournaments, had their devices depicted on their arms or armor, as on their shields, banners, etc.; and as colors could not be retained, particular marks were used to represent them.

All coats of arms, formed according to the rules of heraldry, are delineated on shields or escutcheons, which are of various forms—oval, triangular, heptagonal, etc. The parts composing the escutcheon, or represented on it, are tinctures, lines, borders, charges, etc.

By tinctures, we mean the various colors used, the names and marks of which are as follows, viz.: *Or* means gold or yellow, and is represented by dots or points. *Argent* means silver or white, is plain. *Azure*, or blue, is represented by horizontal lines. *Gules*, or red, by perpendicular lines. *Vert*, or green, by diagonal lines from upper right corner to the lower left, or to the lower right as you face the shield. *Purpure*, or purple, from upper left to lower right, being reversed from map rule as to right and left. *Sable*, or black, by horizontal and perpendicular lines crossing each other.

Charges are whatever may be represented on the field of the escutcheon ; the principal of which, in addition to natural and celestial figures, are the Chief, the Pale, the Bend, the Fess, the Bar, the Cheveron, the Cross, and the Saltier; each of which, although occupying its appropriate space and position in the escutcheon, and governed by definite rules, admits of a great variety of representations.

The external ornaments of the escutcheon are crowns, coronets, miters, helmets, mantlings, caps, wreaths, crests, scrolls, and supporters. Some escutcheons have none of these ornaments, and others nearly all of them. The supporters are placed on the side of the escutcheon standing on a scroll, and are thus named, because they appear to support or hold up the shield. The great seal of the State of Maine has a shield, supported on the right by a husbandman resting on a scythe, representing agriculture, and on the other is a seaman resting on an anchor, the symbol of commerce and the fisheries. The great seal of the State of New-Jersey has a shield supported by the goddess of *Liberty* on the right with a wand and a cap, those being symbols of independence, because among the ancients the *rod* was used by the magistrates in the ceremony of manumitting slaves, and the cap was worn by the slaves who were soon to be set at liberty, and hence they have been handed down from time immemorial as symbolical of liberty and independence,—they are fit emblems of the United States! Many of the seals of the States are designed to represent some peculiar era in its history, regardless of heraldric science : thus, Virginia, after the struggles of 1776, adopted a seal fitly representing the feeling pervading the hearts of her great and chivalrous people. On one side of the seal the goddess of Virtue, — the genius of the Commonwealth —is represented dressed like an Amazon, resting on a spear with one hand, and holding a sword in the other, and treading on Tyranny, which is represented by a man prostrate, a crown fallen from his head, a broken chain in his left hand, and a scourge in his right. Above the goddess is the name of the State, and underneath the words, *Sic semper tyrannis*—"thus we serve tyrants." While this side of the seal represents exultation over the surrender of Yorktown and the triumph of the American arms, the other side contemplates some reflection as to future glory and happiness. In the centre is the goddess of Liberty, with her wand and cap; on the right hand is Ceres, with the cornucopia in one hand and an ear of wheat in the other, and on her left side is Eternity, holding in one hand the globe, on which rests the Phœnix, the fabulous bird of the ancients, that is said to rise again from its own ashes.

The great seal of South Carolina is another symbolic repre-

sentation of the feelings of the people. The device is a date-tree, or the great palm, emblematical of the State, which is supported by two cross-pieces, to which is attached at the junction or cross a scroll or label. Branches of the palm were worn by the ancients in token of victory, and hence the emblem signifies *superiority*, *victory*, and *triumph*. On the border of the seal is the name of the State and its motto:—*Animis opibusque parati*,—"Ready (to defend) with our lives and property."

The great seal of the State of Kentucky was adopted shortly after the confederation of the thirteen original States, and her people, filled with the good feeling of union and universal good-will and peace with all mankind, adopted a very plain symbol, which has ever proved characteristic of the noble and generous-hearted Kentuckian. It is formed of two men, as friends embracing, with a motto in plain English: "United we stand, divided we fall." Such were the sentiments entertained by the sires of that great State,—renowned for having the names of the greatest men of the world recorded with golden capitals upon her bright and glittering escutcheon.

The great seal of the State of Missouri, being of more modern origin than those heretofore mentioned, is somewhat classical in its arrangement. It is composed of "Arms parted per pale; on the dexter side, gules, the white or grizzly bear of Missouri, passant, guardant, proper; on a chief engrailed, azure, a crescent, argent; on the sinister side, argent, the arms of the United States;—the whole within a band inscribed 'United we stand, divided we fall.'" For the crest, over a helmet full faced, grated with six bars, or a cloud proper, from which ascends a star; argent, and above it a constellation of twenty-three smaller stars, argent, on an azure field, surrounded by a cloud proper. Supporters on each side, a white or grizzly bear of Missouri, rampant, guardant, proper, standing on a scroll inscribed with the motto, *Salus populi, suprema lex esto;* and under the scroll inscribed MDCCCXX., the whole surrounded by a scroll inscribed with the words, "The great seal of the State of Missouri." The following is the recognized explanation to the above: The arms of Missouri are represented on a circular escutcheon, divided by a perpendicular line into two equal portions. On the right side, on a red field, is the white or grizzly bear of Missouri, in its natural color, walking guardedly. Above this device, and separated from it by an engrailed line (indented and waved), is an azure field, on which is represented a white or silver crescent. On the left side of the escutcheon, on a white field, are the arms of the United States. Around the border of the escutcheon are the words, "United we stand, divided we fall." For the crest, over a yellow or golden helmet, full faced, and grated with six bars, is a cloud

in its natural color, from which ascends a silvery star,—representing the State of Missouri—and above it a constellation of twenty-three smaller stars, on a blue field surrounded by a cloud. The twenty-three stars represent the number of States in the Union at the time of the admission of Missouri. For "supporters" on each side of the escutcheon is a grizzly bear in the posture of attack, standing on a scroll inscribed with the motto, *Salus populi, suprema lex esto*,—"The public safety is the supreme law." Under the scroll is the date of the admission into the Union, etc.

We have now devoted more space to the seals of States than at first contemplated, but we have done so with the view of showing the fact of heraldric science being blended in the coats of arms of the States of the Union. Having thus noticed a few of the armorials of the States, we will now notice, briefly, the grand national seal of the United States, which was adopted June 20th, 1782, by Congress.

"ARMS: Paleways of thirteen pieces, argent and gules; a chief azure; the escutcheon on the breast of the American eagle displayed, proper, holding in his dexter talon an olive branch, and in his sinister a bundle of thirteen arrows, all proper, and in his beak a scroll inscribed with this motto, *E pluribus unum*. For the CREST: Over the head of the eagle, which appears above the escutcheon, a glory, or breaking through a cloud, proper, and surrounding thirteen stars forming a constellation, argent, on an azure field."

The paleways of thirteen pieces is symbolic of the original thirteen United States that formed the general confederation of the American Union. The thirteen stars and arrows are representatives of the same fact. The stars are on an azure field, and hence the blue field on the flag of the United States. The stripes of the flag represent the paleways of the escutcheon, being gules or red, and argent or silver colors. Thus the flag is composed. Its heraldry is simple and beautiful, full of language, and expressive of great events. The remembrance of the revolutionary times, when the fathers of the American confederacy fought bravely for the supremacy of the will of the people, infuses into the soul new life and affection for the Declaration or Magna Charta of Freemen's Rights.

The grand seal of the American Telegraph Confederation is composed of the most ancient heraldic devices, beautifully illustrating patriotism, renown and virtue. He who follows through life the index of their morals, will be recognized by the world as the noblest work of God—an honest man.

The grand seal we describe thus: the escutcheon, ornamental border, quartered; the first and fourth, the arms of the United States; the second, armorial of Mexico; the third, armorial of

Great Britain, having reference more particularly to the provinces of the Canadas, New-Brunswick, Nova Scotia, and Prince Edward's Island. The crest, an American eagle, erect with out stretched wings, standing upon a silken wreath, azure, gules and argent. In eagle's beak a scroll, on which is inscribed "*E pluribus unum.*" In rear of eagle, cloud proper, from which issue the orders of cuspidated lightning; in rear of escutcheon, the staffs of two United States flags cross at centre, and the colors unfurling—top the staffs, spears and three tassels. The whole being surmounted with a garter, on which is inscribed, AMERICAN TELEGRAPH CONFEDERATION. In the arrangement of this splendid composition of science and art, we have enjoyed the gratification of having the aid of Prof. H. Hays, formerly of one of the principal Heraldic Colleges of England, who is now extensively engaged in his profession at 341 Broadway, New-York. Prof. Hays has, in the execution of this engraving—and also many others which he has engraved for lines of Telegraph—excelled in talents and genius anything of the kind we have ever before had the pleasure of seeing. As a scholar in Heraldry he is eminently worthy of the highest mark of distinction. We thus speak frankly and voluntarily our indebtedness for the valuable and novel information he has so kindly imparted to us relative to this beautiful and antique science and art.

Having given a description of the seal according to heraldic rule, we shall proceed to give the origin and history of the several devices, grouped in its formation. We will then give their explanation as compounded and their application to the telegraph enterprise, and argue, that by a just fulfilment of their teachings, the system of telegraphing would be that which we all deem essential for success and universal satisfaction.

Nations, societies, and enterprises have, from time immemorial, adopted devices as mottoes to infuse into their followers zeal and love for the cause espoused. To see an army of men, battling with another, each with the most restless determination, one army following a flag with a cross and the other army a crescent, we would readily know they were under different religions,—the former Christians and the latter Mohammedans. The sight of a nation's flag rearing from the battlements of a defeated foe, is one of the most powerful incentives in war. Where can there be found a soul living within the pale of the American Union, whose heart is not filled with pride, chivalry and enthusiasm, on hearing the touching lines written by a bard of Maryland during the late war, when the enemy was not far distant from the commercial metropolis of his native State—his native land? The poet spoke those lines

on the Star-Spangled Banner, as though his soul was enveloped in a sea of glory.

So it is with other nations. The poets seem to be inspired, and the same inspiration spreads from heart to heart, until all feel brimful of joy in the achievements of their arms. Not only nations adopt devices around which the people rally, but also religious sects, societies, &c., have symbols peculiar to the principles which give them birth and existence.

Without further comment as to the practice or custom of the past and present ages, uniting in the use of the science of heraldry, we shall proceed to give an account of the different orders of honor, preparatory to the history of the Garter, which surrounds the escutcheon of the grand seal of the American Telegraph Confederation. In giving the history and legitimate meaning of the Garter, we shall also include the crosses of St. George and St. Andrew, the symbolic flag of the Canadas, New-Brunswick, Nova Scotia, or British Provinces. In considering these subjects, we shall transfer in many instances the language of authorities which we have extensively consulted, in studying the complicated subject.

The grounds and causes of founding societies and knightly orders were several and different, though all terminated in one end. Among the principal objects creating these orders were, a desire or love of *honor*, and therein chiefly to excite and promote *virtue* by suitable rewards. Such was the design of King Arthur, when he formed himself and other martial men into a fellowship, which he styled "Knights of the Round Table." Another cause of the origination of the orders was to redress the incursions and robberies of the Saracens and barbarians, to vindicate the oppressed, redeem the enslaved, and to entertain and relieve pilgrims and strangers, which were a part of the duties of the Knights-Hospitallers and Templars. Another reason for their establishment was to fight in defence of the Christian faith, against pagans and infidels. Lastly, when sovereign princes perceived themselves embroiled in wars or dangerous factions, the erection of orders tended to create a tie, restore peace, quiet all jealousies, unite affections, and secure a lasting friendship and powerful assistance, both for their own and their country's safety. To this end badges of several orders were devised and worn.

With a view to illustrate the further origin of the orders, a few of these will be noticed.

KNIGHTS-TEMPLARS.—About the year 1117 this order originated. *Baldwin* II. then reigning in Jerusalem, nine gentlemen, of whom two were of noble extraction, *Hugh de Paganes* and *Godfrey de St. Osmer*, came in devotion to the Holy Land. They were called Brothers of the Militia of the Temple, ordina-

rily Knights-Templars, from the habitation assigned them out of a part of the king's own palace, adjoining the temple of Solomon of Jerusalem. Their first undertaking was to guard the most dangerous ways about that city against the violence and robberies of the Saracens, which made them acceptable to all, and for which they had remission of their sins; but for the first nine years they were yet so poor, that they lived upon the alms of others, and wore clothes bestowed in charity upon them. In memory of their primitive poverty, their seal had the impress in *Math. Pans.* A. D. 1127. They had rules assigned them, drawn up by St. Bernard, Abbot of Clairvaux, by the appointment of Pope Honorius II., and Stephen, Patriarch of Jerusalem. They made their vows of obedience, poverty and charity. Their garb was white, to which in the time of Eugenius III. they added the red cross, and of the same form as worn by the Hospitallers. For a long time, in conjunction with the Holy Sepulchre Hospitallers, they defended and supported the kingdom of Jerusalem, but when their riches increased and their revenues augmented, they grew proud, fell from the obedience of the Patriarch to join with the Pope, and at last, 1370, all the Knights of this order in France were in one hour seized and imprisoned by *Philip le Bel*, king of France, with consent of Pope Clement V., being charged with the most infamous and damnable crimes. In England, *Anno* 1. *Ed.* 2, they were also apprehended afterwards, rendered convicts, and all their possessions seized into the king's hands. Two years after, many of these knights were burned in France, and *Jaques de la Maule*, the last Grand Master, suffered the fate of being burnt at the stake in the year 1320. This Grand Master having seen his noble order dissolved forever, as he thought, he cared but little how soon his end might come. Their lands were annexed to the Hospitallers.

Thus fell for a time the noble order of Knights-Templars, no less famous for martial achievements and renown in the East, than their wealth in the West. They held 16,000 lordships in Europe, and their revenue was two millions of francs yearly. There can be no doubt but what their end was the result of ambition in the bosom of Philip, king of France, and no historian attempts to screen that king from accomplishing the wicked act by suborning witnesses to sustain the points of his restless and ill-designed ambition. The order remained dormant for a long time, but there were a few who escaped from the fatal axe, and in a few years they formed associations, continuing in this private manner to retain their existence for many years; they ultimately became blended with the ancient and honorable fraternity of Free Masons, and to this day hold with singular affection to the ancient rites practised hundreds of years ago.

Editorial.

THE COMPANION.—The first number of the COMPANION, New Series, has been sent forth to the patrons of the work, and thus far has met universal approval. We feel gratified at this result, as we are fully aware of the difficulties attending a publication of this character. We cannot commend all, nor can we do justice to many questions of decided merit. Many subscribers did not receive their number timely, owing to the loss of nearly the entire publication by fire, just as it was ready for the mail. It has been reprinted, and we hope for better luck in future. We need all the patronage of the enterprise, and we hope that these losses will induce those who wish to subscribe, to do so at once. Every operator, president, superintendent, director, and agent of a Telegraph Company ought to be a *bona fide* subscriber to the Companion, and besides, render all the aid in their power to make the work useful to the rising generation of telegraphers.

SCIENTIFIC AMERICAN ON PATENTS.—Our remarks in the January number of the COMPANION, relative to the hostility of this publication to the Morse Patents, seemed to have fired up its editor with horrible indignation, and his answer is couched in language neither creditable to the writer, nor respectful to the dignity of the paper.

In the notice of the COMPANION, no disrespect was intended, and the language cannot be interpreted to be otherwise than courteous. We knew his article did do Morse injustice, and the editor of a daily paper in the City of New-York, who, having read the paper charging Morse with being associated with others, to buy his renewal through Congress, as insinuated by the *Scientific American*, stated, that he was inclined to believe it, and suggested, that the best means of a contradiction, would be for Prof. Morse to contradict it through the press. We heard a friend of the *Scientific American*, and an enemy of Morse, rejoicing over the article in question, in a hotel in New-York, referring to the paper for proof of his assertions. There were others who interpreted the article as we did. We may not have sufficient intelligence to comprehend the writings in the above paper, but we are certain of one fact, that is, that we know how to treat and respect the writings of a cotemporary with gentlemanly manners.

REGULATIONS OF COMPANIES.—We have received the rules and regulations of several Telegraph Companies, and for which we thank our friends for placing such valuable information into our hands. We design, in the next number,

to review the rules of the Atlantic and Ohio Telegraph Company, and such others as we may have room for, intending to embrace the regulations of every Company in America ere we are done. We think that it will tend to bring about a uniformity of system.

Batteries.—We have received several articles on galvanic batteries, applicable to the Electro Telegraph, but for want of room they are deferred for the next number. We are always glad to hear from gentlemen on subjects pertaining to the Telegraph.

Size of this Number.—Owing to the delay in business resulting from the late fire, and our own illness, the present number contains only 48 pages.

New-York and Boston Line.—Since our last number went to press, we have had opportunities of witnessing the working of this line. It has been very generally repaired, the old iron insulators removed, and the brimstone insulators banished from the face of the earth. Think of it, gentlemen westward of the Mountains, of a line between two of the principal cities of the United States, having brimstone insulators! Can any one marvel why this line has worked so badly? The wonderful and untiring zeal of Mr. Wood has already redeemed the line from that gloomy mantle that seemed to inclose in its folds the whole line. With Mr. Wood as Superintendent, and Mr. Smith at New-York, and Mr. Richards at Boston, the old pioneer line from Boston to New-York can ere long, if not now, rival in splendor the working of any line in the world. They are competent telegraphers, and capable of mastering any difficulty. Besides these, there are others on the line whose skill and ability are not a shade behind the best corps of operators in the Union

Engravings and New Register.—The number for March will contain some very fine engravings of a new Register, designed for universal use. It will be one of the most complete pieces of machinery ever presented for use on any line. Companies needing new Registers, would do well to wait until they hear fully as to this one. The engravings of the Relay Magnets will be in the next number also, as well as the keys and such other parts as we may deem necessary. We are progressing finely in furnishing supplies for the respective lines, and with a little effort to get all things moving correctly at first, we anticipate much good to result from our arrangements, enabling lines to procure materials at reduced rates.

National Lines.—The range of lines known by the above title is composed of several companies, commencing at No. 23 Wall St., New-York; they run to Philadelphia, Pittsburg, Cincinnati, Louisville, Nashville, Vicksburg, Natchez, to New-Orleans. This is termed the Southern and Eastern connection, and is the only range having two or more wires the entire distance. Lines to Cleveland, Chicago, St. Louis, &c., &c., diverge from points mentioned on the above route. The business from New-York and other Eastern cities with New-Orleans on these lines is very great, and the public

ought to feel greatly indebted for the promptness with which it is executed. The public, however, never feels grateful for anything, and though the lines above use the greatest care, and spare neither money nor labor to secure a regular communication between the cities, the patronage is such as to enable the lines to pay but little upon the investments. Pertaining to the capital invested in telegraphing, we contemplate saying something about it ere long. We give the following newspaper notices of the National lines.

Heavy Business in Telegraphing.—The National Telegraph line was in fine working order on Saturday, and communicating directly with the principal Eastern and Western cities. We learn from the obliging reporters that the number of messages left for transmission, during twenty-four hours, were 310, over 100 of which were for New-York, and the number received from all points was 261, making an aggregate of 571! without including what are termed "office messages." This is a large business for a single day, and we doubt if it has ever been beaten in the annals of Southern telegraphing.—*New-Orleans Paper.*

Another Great Telegraphic Feat.—The Southern and Eastern lines, uniting at Louisville were again working last night through from New-Orleans to New-York and back, a distance of over two thousand miles, without repeating. The history of telegraphing will not show an instance in the world to surpass this. It is certainly working the largest circuit in the United States. The lines, of course, are in fine order, and the companies are reaping the reward of their diligence. From fifty to one hundred and fourteen messages per day are passing and returning between those two distant cities. On Saturday, the 10th, the office of the New-Orleans and Ohio Company, at New-Orleans alone, received for that day's business $553 78, or at the rate per month of twenty-six working days, of $14,397 28. If this line can be kept working as it has been recently, it will realize the most sanguine expectations of its early friends.—*Louisville Journal.*

Wonders of the Telegraph.—Saturday evening the operators in the New-York and New-Orleans National Telegraph offices were holding a social chat in regard to matters and things in general, as if they were situated in the same apartment. The following conversation occurred in regard to the expected arrival of the steamer. Mr. Fuller, the reporter for the associated press at New-Orleans, came into the office there, and asked if the steamer had arrived yet, when New-Orleans asks New-York if the steamer has arrived. New-York says, "Not yet, but is hourly expected; she is nearly three days over due, and much anxiety is manifested in regard to her." New-Orleans says, "Thank you, that came good."

The distance from New-York to New-Orleans by the route the line runs is about 2,000 miles, and this is the first time in the history of the electric telegraph in this country, when direct communication was had over half that distance, without rewriting; and it is quite certain that such a feat has never before been performed on this globe. Just imagine, parties separated 2,000 miles communicating with each other as if they were face to face.—*Cincinnati Commercial.*

Complimentary.—We publish the annexed correspondence with great pleasure, and regret we could not give an engraving of the beautiful testimonials presented. The recipient of this splendid reward of merit, Mr. T. S. Faxton, of Utica, New-York, has been connected with the telegraph for many years. He has nobly stood by his line in the hours of adversity, and he left it in prosperity. Those who have been in like difficult places know

how to feel for him. We admire his energy, and hope his years will not end before his talents and services will be again in the cause.

PRESENTATION.—Some days ago we noticed that a beautiful Malacca Cane had been prepared for presentation to T. S. Faxton, Esq., by the employees of the New-York, Albany and Buffalo Telegraph Co. Since then the gift has been presented, accompanied by a letter expressive of their regard, to which he has replied in a manner characteristic of the man.

We give copies of the note, and Mr. Faxton's acknowledgment.—*Utica Paper.*

UTICA, Dec. 1, 1853.

THEODORE S. FAXTON, Esq.—Dear Sir:—The Superintendents and Operators of the Company over which you have until recently presided, have assigned to me a task most grateful to my own feelings; and although I may but feebly and imperfectly give expression to their sentiments on the occasion, yet I trust you will give full credence to the sincerity in which they are presented.

The difficulties through which you have brought the Telegraph to its present maturity, were but little known except to those associated with you in the business; they, however, fully appreciated them; they can testify to the indomitable perseverance with which the many vexatious embarrassments incident to its early history were met and overcome; and thus the "visionary experiment," as the Telegraph was wont to be considered, triumphantly established as a permanent and invaluable auxiliary to the business of the times.

As a mark of their appreciation of the ability and energy by which your management was distinguished, but more particularly to express to you their regret that circumstances have induced you to withdraw from the position you have so honorably occupied, the employees of the New-York, Albany and Buffalo Telegraph Company very respectfully request your acceptance of the accompanying Cane, as also an assurance of their ever retaining a pleasing recollection of the frankness and kindness by which your business relations with them were characterized.

I am, dear Sir,
Yours very respectfully,
EDWARD CHAPMAN,
Treasurer N. Y., A. & B. Telegraph Co.

UTICA, *Dec.* 3, 1853.

E. CHAPMAN, Esq., Treas. N. Y., A. & B. Tel. Co.

DEAR SIR:—Your favor of the 1st inst., accompanying a splendid Cane from the employees of the New-York, Albany and Buffalo Telegraph Co., has just been presented to me. You will allow me to express to them, through you, my feelings of gratitude for this mark of their approval of my business intercourse with them while associated with them in the duties of telegraphing.

As you justly remark, the Telegraph enterprise was truly considered a "visionary experiment," but time and perseverance have demonstrated its practicability, and its utility is now appreciated by every business man in Christendom.

It is to me a source of gratification to know that almost every hand connected with this token of regard commenced their telegraphic occupation with this company, and have been connected in the business with myself up to the time of my resignation.

It is with pleasure I accept the gift, the value of which is not to be estimated by dollars and cents. It is entitled to a higher and more worthy consideration, inasmuch as it is a free-will offering from those whose esteem I shall always endeavor to hold in due regard.

Accept for yourself, and those associated with you in the business, my best wishes for your prosperity and happiness.

Yours respectfully,

T. S. FAXTON.

GREAT DISCOVERY.—A UNIVERSAL TELEGRAPH.—*The Mining Journal* minutely describes the marvellous improvements effected by Mr. Wilkins in the electric telegraph, by which the system bids fair to be thoroughly revolutionized. Mr. Wilkins is a telegraph engineer at Hampstead, and has secured a patent for his extraordinary invention, which will be made available to the public by the Universal Electric Telegraph Company. The improvements for which Mr. Wilkins's electric telegraph will be distinguished are intended to meet all existing defects. It will form one of its very peculiar and striking characteristics, that instead of the message being, as at present, expounded often by guess, liable to be misunderstood or mistaken from variations of the index, or from many other causes, *the message will be written by the telegraph instrument itself*. By means of his singularly ingenious apparatus, the message leaves the telegraph written on paper by the instrument in clear and distinct characters, delivered in a continuous line and unvarying position. It is not even dependent, as was formerly proposed, on the chemical action of the electric fluid on certain sensitive colors, but the machine will enable parties to perpetuate an accurate record of the message, the value of which, in all intercourse, as well in affairs of State as in all legal, monetary, and commercial transactions, is almost incalculable. The ingenuity is perfectly marvellous which arranges the telegraphic apparatus to be worked by the electric current in such a manner as to give motion to a marker, or tracer, and thereby impress, mark, or otherwise render visible, in a continuous line on paper, characters representing letters, words, and figures on the recording surface, which is kept constantly moving by means of clockwork, or other suitable machinery, while the characters are marked, or otherwise produced by the electric current, in a fixed manner, capable of being read upon it. By a contrivance of surpassing ingenuity, the transmission of the message will be simultaneous to any number of radiating stations without the aid of intermediate operators, only one operator being required at each telegraph. This branch of improvement is effected by a delicate piece of machinery, the "Automaton Repeater," by means of which any number of towns or places, within the circle of connection, may be communicated with at the same moment by one and the same electric touch. Mr. Wilkins's plan is also remarkable for the extreme simplicity of the telegraph, for one wire will be sufficient, and in order to prevent the uncertainties which have impeded the development of the telegraphic system, he has devised a superior plan of insulators. It is calculated to insure the most perfect and unerring accuracy by the total absence of quivering points and needles, and by abstaining from the use of chemical preparations, always liable to mislead and very often to fail. It will possess this further great advantage, that by a return communication the message will be repeated at the place from which it is sent, instantaneously with the delivery of it at the place for which it was intended, and the person sending it will thus be enabled at once to see, himself, that his message has been accurately transmitted, the telegraph, without any other intervention, in effect insuring its accuracy. The directors contemplate telegraphic communication with nearly 800 principal towns and places in the United Kingdom, irrespective altogether, when necessary, of railways. The company propose to establish district offices in all or most of the towns and places in the kingdom, containing over 2,000 inhabitants, for the purpose of receiving and transmitting messages upon the principles of radiation. When unerring certainty is thus assured, and the price and means of general communication brought within the reach of every person, it will be difficult

to speculate upon the possible extent to which the public may avail themselves of these proposed benefits.

The above is from the English Mining Journal. The editor seems to be rejoiced, and anticipates great results from this new and splendid achievement! As compared with the tardy system now used in England it certainly is a great stride towards perfection, and ought to be universally accepted. The system boasted of will not be adopted, because it is the invention of an American. Let the editor refer to the archives of the English Patent Office, about June, 1838, and he will find an application on file for a patent by Prof. Morse, of America, for the same invention, now newly proclaimed by the Journal. Morse was refused a patent because a description of his invention had been published. It seems that England was not only unjust enough to refuse Morse a patent for a *bona fide* invention, but now wishes to claim the invention as her own, fifteen years after it has been before the world. The plan may be to claim it as English to guarantee success. *Indocti discant, et ament meminisse peritis.*

New-York, Buffalo, and Chicago Range.—This range of lines is now better connected than ever, and transmits business from New-York to Chicago with one writing. The lines have been well insulated, and increased energy has brought them to a state of perfection never attained before. The Superintendent of the New-York end, Mr. Palmer, informs us that they can now transmit business as prompt and correct with Detroit, Chicago, and the West, as can be done on any range of lines of equal length in the country. The end is great, and we hope their success will be triumphant. We clip the following notice from an exchange paper:

Telegraphic Feat.—Messages were received in this city yesterday, *via* the Morse, New-York, Albany and Buffalo Telegraph, *direct* from Chicago; and we learn that arrangements have been perfected by which messages will be hereafter sent between the two cities in a single circuit.

Pictorial Life of a Telegrapher.—We are advised of the early issue of this interesting publication, containing some seventy engravings illustrating how telegraphers live and act. We have seen the original copy, and feel fully authorized to say, that it will be a work of interest and fun. It will be published at Louisville, Ky., by Mr. George Rutherford, of the National Lines, to whom subscriptions may be sent. We copy the following from the *Louisville Times* pertaining to this publication on the Telegraph:—

We are also advised of a forthcoming Pictorial work on the order of Cruikshanks' graphic caricatures, being the adventures of a telegrapher, the parties and scenes all being connected with the New-Orleans and Ohio line. It is a matter of some pride as well as pleasure to the editor of this paper, as the chief manager of that company, to be able to state, that all these pioneer enterprises in telegraph literature are the work of gentlemen who have been or are now connected with him in business. It speaks well for the talents, enterprise and industry of the respectable and eminently intellectual corps of telegraphers connected with this great Southwestern Telegraph line extending from Pittsburg to New-Orleans.

Maysville Submarine Cable.—We noticed in the former number of the Companion, that the Maysville cable had failed. Since then, another has been constructed, which has proved successful. The following we take from one of the Western papers, viz. :—

We are gratified in being able to state, that the New-Orleans and Ohio Telegraph Company, after repeated failures, and at a great expense, have at length succeeded in securing a double submarine crossing at Maysville, Ky., being the first submarine cable with two perfectly insulated wires yet laid, so far as we know, in the United States. Mr. J. B. Sleet has accomplished this work, under the directions of Mr. Tanner, President.

The New Orleans and Ohio and St. Louis and New-Orleans companies have laid a greater length of submarine cables this summer, of the kind to resist such obstructions as occur on the Western waters, than all other lines in this country. There are now five cables on these lines, viz: the double wire cable at Maysville, and single wire cables across the Tennessee and Ohio rivers near Paducah, the Mississippi at Cape Girardeau, and Merrimac eighteen miles below St. Louis."

Besides the above, there is a cable across the Ohio at Cincinnati on the House line, also at St. Louis on the Wade line. The latter was the pioneer cable. None but Mr. Andrew Wade had the courage to risk the expense. It has resisted the floods nobly.

Halifax and Boston Line.—We learn that this line continues to prosper and that its business is greatly increasing. We call it one line, though composed of two companies,—the Maine Telegraph Company and the Nova Scotia Electric Telegraph Company. Mr. James Eddy is the Superintendent of the former, and since his line has made a direct connection with Boston, the business is performed with much more speed and accuracy. We copy the following notice from a New-Orleans paper, and though speaking very justly of the merits of the line, exhibits great ignorance, as there is no House Telegraph east of Boston.

"We are gratified to learn," says the *Charleston Courier*, "that great improvements have just been made in telegraphic facilities between New-York and Halifax, by which communications, which heretofore have been re-written at four or five different points, are now sent direct, with but a single repetition. The new plan enables the lines to transmit messages in less than one-quarter the time heretofore required, and also lessens, in a very material degree, the liability to make errors. Messages were sent to and received from Halifax in the space of five minutes, via the House Printing Telegraph line. The distance by telegraph between Halifax and New-York is about one thousand miles."

Sandy Hook Telegraph.—We take the following notice of this important line from the New-York *Times*. We admire the spirit of the editorial, and wish the merchants would properly appreciate the great value of the electric communication with that point. Sometimes we see them very liberal—would give any amount of money if the line was in order that they might hear from a given vessel, but when the line is in order, fifty cents for a message over a line of about 120 miles long, without other offices or business to sustain it, looks to some of them as "large as a cart-wheel." Mr.

Walter O. Lewis is the lessee of the line. The House instrument is used. We hope he will have better luck than telegraphers generally.

"The great value of the New-York and Sandy Hook Magnetic Telegraph Line to the underwriters, and to the whole shipping interests of the city, has been well illustrated within the past few weeks, as through that channel most important and minute information has been conveyed from stranded vessels in the vicinity of Sandy Hook, to their owners and underwriters in this city, by which means many lives and much valuable property have been saved. The line is, as yet, but partially organized for business, but we trust its attentive Manager may receive adequate support from the underwriters and shipping merchants of the city, to enable him to perfect all of his arrangements for working it in the most efficient manner. Mr. Lewis, the Manager of the line, may be found at all hours at the office of the Company, No. 19 Wall-street, corner of Broad-street."

Notices of the Companion and Tariff Scale. — The following from the *Louisville Times*, edited by Col. William Tanner, President of the longest range of lines in the world, with whom we have been associated for many years, thus speaks of the Companion. We feel thankful for his good opinion :—

"This is one of the series of useful, practical publications which the genius and the enterprise of the present age have produced in rapid succession to an extent never before known in the periodical literature of this country. The great industrial pursuit of which it is an advocate and exponent, has, within the brief period of eight or nine years, established for itself claims upon the attention of the world not surpassed, if equalled, by any other enterprise of science and art of the present century. Any publication devoted exclusively to this vast and increasing pursuit, properly conducted, must command the attention, not only of the thousands of intelligent persons connected with it, but of the public at large.

"This unpretending monthly is designed not only to enlighten the public in regard to the principles of the science, but to inform those engaged in the business of the details of the system and of its success and progress It will be the repository of every thing interesting connected with each line operating under the Morse patents in the United States, and will record all improvements, suggestions, and new inventions for the more successful prosecution of the business; and in fine, will be a medium through which will be made known all that is connected with telegraphing.

"The position of the editor as Secretary to the voluntary confederation of the managers of the various lines will enable him to have access to all such sources of information as it may be proper to impart to the public, and his industry and long connection with the business are guarantees that he will do his part faithfully in making the work all that it promises to be.

"We are promised in a few days, from the same publishers and editor, a *Compound Tariff Telegraph Scale*, to be published monthly, in the same form as the Companion, containing 32 pages, with corrections and additions as they may occur. This, also, will be an eminently useful work, and should receive the encouragement of every company in the Union. It will enable every telegrapher to know what to charge, and every person using the telegraph lines, to know just what he has to pay for a message sent to any point in the United States or the British Provinces.

Here is a notice from the *Evansville Journal*, edited by A. H. Sanders, Esq., who always writes well, and is a judge of a good work. We always admired his good taste :—

Shaffner's Telegraph Companion.—We are indebted to Tal. P. Shaff-

ner for the January No. of a new work of which he has just commenced the publication at New-York, of the above name. It is issued monthly, at $2 per annum, or with the Telegraph Chart at $3. It contains a large quantity of reading matter devoted to Telegraphy in all its branches. It is a work almost indispensable in telegraph offices, and one which would prove useful to any reading man. Mr. Shaffner is well known in the West as a builder and superintendent of lines, and as an energetic business man. He is a fluent writer, and fully conversant with telegraph matters, so that he cannot help making a good telegraph periodical.

Extract of a Letter from Freeman Brady, Operator, Washington, Pa.—"Sir:—It affords me pleasure to be able to contribute a little aid to you in your praiseworthy, and, to a telegrapher, essentially necessary enterprise. Your COMPANION is replete with useful information, not only to a person engaged in the business, but to all persons who take any interest in the advancement of science. Your TARIFF SCALE is of the utmost value to Companies, and renders it the greatest aid to operators in charge of offices."

Extract of a Letter from C. Bassit, Operator, Roscoe, O.—"Your publications for January are received, and I am very much pleased with them. I need a work devoted to the details of practical telegraphing. Is there such a work published?"

[There is no such work in existence at present, though there is one in preparation.—EDITORS.]

Extract of a Letter from A. E. Trabue, Operator, Nashville, Tenn.—"I sincerely hope your Magazine will be the companion of every operator in the country. It is full of interest and information for telegraphers."

We publish the following notice to the respective Telegraph Companies of America, and hope it will tend to increase the zeal among them to be represented on that occasion. There are questions of very great importance that will be introduced to the Convention, requiring all the wisdom that can be associated to act upon, with proper consideration. We hear of the intended presence of a large representation.

To the Morse Telegraph Companies of America:—

The next Annual Convention of the American Telegraph Confederation will assemble at Washington City March 6th, 1854, and all companies using the Morse American Electro-Magnetic Telegraph are requested to be represented by one or more delegates. A general attendance is earnestly requested, as matters of importance to the system of telegraphing are expected to be brought before the Convention.

P. P. FRENCH, *President.*

WASHINGTON, *January*, 1854.

Vol. I.—No. 3. MARCH, 1854

SHAFFNER'S

Telegraph Companion,

DEVOTED TO THE SCIENCE AND ART OF THE

MORSE AMERICAN TELEGRAPH.

BY TAL. P. SHAFFNER, ESQ.,

SECRETARY OF THE AMERICAN TELEGRAPH CONFEDERATION,

Washington City, D. C.

"Canst thou send lightning, that they may go, and say unto thee, Here we are?"—*Job.*

"The names of Franklin and Morse are destined to glide down the declivity of time together—the equals in the renown of inventive achievements."—*F. O. J. Smith.*

"As the inventor of the Electric Telegraph, you, Prof. Morse, stand pre-eminent."—*Arago.*

"The Electro-Magnetic Telegraph—that last and most wondrous birth of this wonder-teeming age."—*Congressional Report on Morse's Telegraph.*

TERMS, $2 PER ANNUM.

NEW-YORK:

...ISHED MONTHLY, BY PUDNEY & RUSSELL,

No. 79 John-Street.

1854.

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SHAFFNER'S
TELEGRAPH COMPANION,

DEVOTED TO THE SCIENCE AND ART OF THE

MORSE AMERICAN TELEGRAPH.

VOL. I. MARCH, 1854. No. 3.

Art. I.—MORSE AMERICAN TELEGRAPH PATENTS.

CONTROVERSY WITH O'RIELLY—PEOPLE'S LINE TO NEW-ORLEANS—COMPLETED IN 1848 TO NASHVILLE—APPLICATION FOR INJUNCTION—THE COLUMBIAN TELEGRAPH AN INFRINGEMENT—MORSE SUSTAINED—INJUNCTION AWARDED—VIOLATORS ARRESTED—THE LINE SEIZED BY THE MARSHAL—THE BAIN SYSTEM—APPEAL TO SUPREME COURT—THE FINALE OF THE LINE—MORSE PATENTS OF 1840 AND 1846.

On the 13th of June, 1845, Prof. Samuel F. B. Morse, and associates, entered into a contract with Henry O'Rielly, granting to the latter the right to construct a line of Morse's Electro-Magnetic Telegraph from the seaboard to St. Louis, and to the principal towns on the Lakes. Morse and associates inserted in the contract a prohibitory clause against O'Rielly's extending the line to New-Orleans, expressly reserving that right to the patentees. Ere the line had reached Pittsburg from Philadelphia, a misunderstanding arose between the patentees and Mr. O'Rielly. The press throughout the land were burdened with circulars of caution, proclamations of fraud, and supremacy of respective rights. In December, 1847, the line was finished to St. Louis. By the exercise of great energy, worthy of a nobler end, Mr. O'Rielly obtained the popular furor in his favor, and against the merited and just rights of Prof. Morse. The people and the press regarded Mr. O'Rielly as a public benefactor. Success crowned his efforts within the range of his contract from Morse. In the midst of this conquest, his discretion became confused; and his enmity to Morse and associates, encouraged by public manifestation, made to order, induced him to make a grand but desperate bulge towards New-Orleans, totally regardless of all propriety, the dictates of sound reason and justice to the rights of Morse, whose invention he had and was using on

the immense range of lines constructed under the contract of June, 1845. It was a leap from prosperity to adversity—from an Eden to a vortex of fatality! Whatever may have been the misunderstanding between the patentees and Mr. O'Rielly, a justification of the construction of the line to New-Orleans, and the efforts to destroy the property of Morse, can find no existence. The grand moral code of society is unstained with a word in its defence upon its bright pages!

The public and the press joined with Mr. O'Rielly at the time, and thus encouraged, he felt sanguine of success. Rapidity of construction, regardless of permanency, was the test with the public as to the relative rights. The first flash to a city or a town determined who was right and who was wrong. Thus the public became accessory in the deeds of error, in a shameful waste of the rights of an American inventor, who now, by the decree of a tribunal, elevated above the poisoned fangs of sordid minds, proclaim to the world, through the heralds of the Supreme Court of the first nation on earth, that Morse is the true and original inventor of that grand and most wonderful art—the ELECTRO-MAGNETIC TELEGRAPH.

About the 23d of December, 1847, after the failure of other efforts, Hon. Amos Kendall and Hon. F. O. J. Smith, feeling provoked at the unwarrantable proceedings of Mr. O'Rielly, contracted with William Tanner and Tal. P. Shaffner, of Kentucky, to construct a line of Telegraph from Louisville to Nashville, Tenn., and from Louisville to Lexington, Ky., the same to be a section of the line to New-Orleans, and to the East therefrom. Messrs. Kendall and Smith advanced about $20,000 in the building of this section.

As soon as the existence of the above contract was known to Mr. O'Rielly, he placed a large force to work in constructing the line south of Louisville. Here commenced the race for New-Orleans. The parties agreed to occupy separate sides of the road, to avoid confusion and conflicts among the workmen. The O'Rielly line, proclaimed as the People's Line, was completed to Nashville about the last of February, 1848. The Columbian Telegraph was announced and put in operation. The equivalent for the Relay Magnet was a series of electro-magnetic multipliers, each being composed of a magnetic needle delicately suspended, and placed within a longitudinal coil of copper wire, covered with silk thread. In this arrangement, the needle is extremely sensitive of the least current transmitted through the coil. The wire passing many times above and below the needle, tends to move its poles with the united influence of the whole, and in the same direction; so that the effect of a single wire becomes multiplied in nearly the proportion of the number of times the coil passes above and below the needle. A needle thus circumstan-

ced, with a divided circle to measure the angle of deviation, constitutes an instrument termed a galvanometer, or, as it was first termed, *electro-magnetic multiplier*. Faraday, by means of a delicate instrument of this kind, succeeded in identifying common and Voltaic electricity as a source of electro-magnetic action. The application of this instrument as a part of the Columbian proved defective, owing, we believe, to its extreme sensitiveness. The Mutator was then introduced in its place, to perform the functions of a Relay Magnet. This instrument will hereafter be described as understood by the Court and explained by the inventor.

To enable the reader to understand the nature of the Columbian Telegraph, we copy a description of the Register, and Mutator, and history pertaining thereto, from the opinion rendered by the Hon. Thos. B. Monroe, of the District Court of the United States for the District of Kentucky, viz. :—

COLUMBIAN TELEGRAPH.

"The only question under this head is, upon the identity of the Telegraph of Mr. Morse, and the Columbian Telegraph employed by the defendants. The operations by the defendants are not controverted. They put their defence exclusively on the ground that their Telegraph is not within the description and given specifications found in the schedule of the patents under which the complainants assert their exclusive right.

"Now, having given a history of the invention of Mr. Morse, and its introduction into public use, it will be but equal to give the like history of the invention of the Columbian instrument, and how it was introduced to the public.

"It happened that Mr. Morse and his associates, in their anxiety to promote the establishment of lines of Telegraphs, and extend their operations, in June, 1845, entered into a contract with this Mr. Henry O'Rielly, by which he undertook, on terms then agreed upon, to raise the capital for the construction of a line of Telegraph from Philadelphia, or other convenient point on the great seaboard line, by the way of Harrisburg, and other intermediate towns, to Pittsburg, and thence through Wheeling and Cincinnati, and such other towns and cities as the said Henry O'Rielly and his associates might elect, to St. Louis, and also to the principal towns on the Lakes.

"It turned out, that under this contract, some progress having been made in the raising of capital and constructing Telegraph lines, the parties differed in respect to the contract, in relation to what had been done, and their rights. And,

"In this controversy, Mr. O'Rielly found what induced him to determine to establish a line of Telegraph from Louisville, via

Nashville, and other towns, to New-Orleans not under color of his contract, or otherwise claiming under the patents of Mr. Morse, but in disregard thereof.

"There was evidence that he at first represented that he had the right to establish these lines under his contract with Mr. Morse and others, and so operate under his patents, but this pretension was shortly afterwards abandoned.

"He was not, however, in the situation to contest the validity of the patents of Mr. Morse.

"He had formed joint stock companies, for the construction of Telegraphs, obtained the subscriptions, and induced his associates to advance their money on the faith of the validity of these patents. And,

"In the formation of such associations, he had reserved to himself and the owners of the patent large portions of the stock, and, of course, the right to corresponding shares of the dividends; and which was accorded to him on no other consideration but the supposed exclusive right of the patentee.

"The other partners subscribed and advanced their money. Mr. O'Rielly subscribed the patent rights of Mr. Morse, and was to have the same ownership in the joint stock, and dividends upon it, which the capitalists were to have upon their money, actually advanced.

"If, then, these patents were null, he was committing frauds upon these subscribers, to the full amount of the interest in the joint stock companies, he had, by such means, so reserved and secured to himself and the owners of the patent.

"It did not then become him to denounce these patents, and declare that all claims to rights under them were worthless. Such an admission on his part, in one of these associations he had formed on the north of the Ohio, would have at once established that he had no right in it, but that it belonged to those who had advanced the money by which the Telegraph had been constructed; he therefore looked for some other colorable invention, under which to construct and work a Telegraph in Kentucky.

"It happened that Mr. E. F. Barnes had been employed in the capacity of an operator on the Telegraph line of Mr. Morse, from Buffalo to New-York, and Mr. S. K. Zook had been operator and superintendent on the line from Washington City to New-York, and having both become well acquainted with the operations of all the instruments, and learned the principles of the Telegraph of Mr. Morse, each conceived some idea of improvements on the instruments of his invention, and uniting their notions, they contrived an instrument, in substitution, as they supposed, of the Receiving Magnet, and another instead of his Register, and, denominating their combination 'The Columbian

Telegraph,' claimed it as an invention. These young gentlemen applied to Mr. O'Rielly, or he applied to them, and some contract was made between the parties, for the use of this Columbian Telegraph, and Mr. O'Rielly commenced the construction of posts and wires from Louisville to Nashville, and in the month of May had gotten his Telegraph in operation."

COMPARISON OF THE TELEGRAPHS.

"1. The Main Circuit, with its Battery.

"2. The Key, with its Signal Lever or Correspondent.

"These parts of the two Telegraphs are identical; no diversity was pointed out, except that whilst the helices on the horseshoe magnet of Mr. Morse, which is constituted of the windings of the small wire, are fixed, this Magnet, in the Columbian Telegraph, is movable, and by its motion to and fro, when charged and *discharged*, instead of by attracting other things to it, performs its office.

"3. The Local Circuits, with their Batteries.

"The defendants have *two* batteries similar to the one of Mr. Morse, and two circuits of conductors in all respects similar to his, until we come to those which are instruments, or parts of the instruments of operation, and it is to these the attention is to be now applied.

"One of the conductors of Mr. Morse's office circuit, it will be recollected, is a perpendicular movable lever, and it is the movement of this lever into contact with the platina point of a screw, caused by the attraction of the armature on it, to the Electro-Magnet when charged by the opening of the main circuit by its signal lever, that the office circuit was opened and the register made to act and record the intelligence. Now, in the stead of such a lever, the defendants have this device to open and close alternately their two circuits, and thereby work their register.

MUTATOR OF THE COLUMBIAN TELEGRAPH.

"The Receiver, or Mutator, as it is called by Messrs. Barnes and Zook, is thus described by one of the inventors of this Telegraph, who was examined upon the hearing, in explanation of its several instruments and their operation:—

"'There is a thin U-shaped piece of soft iron suspended upon an arm attached to a cross-bar with pivots, so placed that its extremes approximate to the poles of a permanent Magnet.

"'About each leg of the soft iron is placed a brass spool filled with small insulated wires, the iron being left free to move within the spools.

"'At the curve of the soft iron is placed a spring, so arranged as to have a tendency to draw the iron from the Magnet.

"'In the absence of the Electric current, the magnetism of the permanent Magnet induces magnetism of opposite polarity in the soft iron, and holds it firmly.

"'A current of Electricity being passed through the wire in such a manner as to induce in the iron magnetism of a similar polarity with that of the permanent Magnet, the iron is in a measure released from the power of the permanent Magnet, and is drawn away by the force of the spring; and upon withdrawing the Electric current, the reverse motion is obtained from the force of the permanent Magnet alone that overcomes the power of the spring.

"'The motion so obtained renders it possible to connect the poles of two resident or local batteries, the currents of which run in opposite directions.' Now,

"The two spools, or helices, formed of the small wire of the main circuit wound on two legs of this U-shaped bar of soft iron, correspond to the two helices and horse-shoe Magnet mentioned in the description of Mr. Morse's Receiving Magnet.

"But this Magnet, instead of being fixed as that of Mr. Morse, is so suspended as to move with facility to and fro within the helices.

"On this bar, between the two helices or spools, there is fixed an upright bar, which extends up between two points of metal. We will return to these points of metal presently.

"Opposite the other *ends* of this bar, and which correspond to the *heels* of the horse-shoe, there is placed a fixed Magnet.

"When the main circuit is interrupted, and the instrument is at rest, this upright bar, which is in fact an arm of the Electro-Magnet, rests against one of the points of metal, and keeps one of the office circuits closed, whilst the other is broken.

"When the main circuit is open, and thereby this horse-shoe magnetized, it is impelled towards the fixed Magnet. This motion at once brings the upright bar, an arm of the Magnet, from contact with the point of metal against which we said it rested, (when the local circuit with which it is connected is broken,) and brings it into contact with the opposite point of metal connected with the other circuit, whereby *it* is opened.

"The main circuit being then broken, and the horse-shoe no longer a Magnet, a spring brings it back to its former position, ready to act again, by being again magnetized by the reopening of the main circuit. * * * *

"But in what are the two instruments identical?

"Each is worked by the motive power of the Electro-Magnet, and the mechanical power of the spring. The action of each, one way, is caused by the charging of the Magnet, and on the

Magnet being discharged, each is brought back to its position by the mechanical action of the spring. And,

"The operations of each are according to the will of the correspondent upon his lever, in the distant office, and each produces the same corresponding action in the Pen of the Register which indents the intelligence dispatched.

"They both effect this great end first accomplished by Mr. Morse in his discovery of the practicability of combining the circuits of Electricity, by which the extent of the operations by the Electro-Magnetic Telegraph is left circumscribed only by what may render impracticable the connecting of the necessary conductors of what constitutes the motive power of the instrument.

"It is concluded that the instrument called the *Mutator* of the Columbian Telegraph, in its combination therewith, is substantially the same with the Receiving Magnet, in its combination with the Telegraph of Mr. Morse; and that the defendants, in the use thereof, committed an infringement on the rights of the complainants, whether their Register, or any of its instruments, are within the description of the corresponding instruments of the complainants or not.

THE COMPARISON OF THE REGISTERS.

"The description of the Register of the Columbian Telegraph, with its instruments, will be first given, in the words of one of the inventors, who explained it on the hearing, after which we will proceed with the comparison.

"'It is composed of a train of clockwork, for moving the paper, and the apparatus necessary to produce the desired result, viz.:

"'Two permanent Magnets are so placed, that their opposite poles approximate to each other. Between the poles of these Magnets, a soft iron bar is suspended upon a carriage. The iron is wrapped with number 18 to 20 wire, insulated. In the absence of the electrical current, this bar stands at a point of indifference, being attracted to neither Magnet; but in closing one of the local circuits, the electrical current passes one direction through the wires in the iron, giving it polarity, and affinity for one permanent Magnet, while it is at the same time repulsed by the other; upon interrupting this, and closing the circuits of the other local battery, the current flows in a contrary direction, giving opposite polarity; and reverse motion is obtained.

"'Attached to this bar is an arm, at the extremity of which is a sharp point, so placed that at each alternate motion of the bar, the point comes in contact with the paper, placed before and running over a grooved plate in such a manner that an indentation is made.

"'Alternate dots and lines of these indentations form a system of arbitrary signs, representing the alphabet and numerals; the whole rendering it possible to make an instantaneous communication at a distance.'

"Now, we have here, in the first place, the motive power of the electro-magnet of the Register of Mr. Morse; and if no more was said, there would seem to be, in this respect, an identity.

"But it was argued for the defendants, that here, in the Columbian instrument, the repulsive as well as the attractive power is employed. Suppose it is, still the attractive power is used, and it cannot be maintained that the addition of another power, without any other change, constitutes a difference which will give to any one, making such addition, the right to employ the formerly invented instrument. He may, as before said, have his patent for this improvement, or he may use it without a patent, but he cannot in that mode acquire the right to use the original.

"But is there any difference between these two powers of the Magnet? It is wholly unnecessary to inquire and ascertain to what purposes these things are different, or to what intents they are one and the same; or in what sense the terms, identical and different, may be applied to them; we are concerned only with the settling the signification of words in order to apply the patent laws. And,

"It is apprehended that when an exclusive right has been granted to the use of an instrument worked by the *attractive* power of the Magnet, the working such an instrument by its *repulsive* power would be an infringement; and that the proposition is so obviously true, that it would be useless to look after plainer propositions from which to prove it; and it follows from this conclusion, that this diversity between the mode of working the two instruments cannot, of itself, avail the defendants.

"But it was insisted that the machinery, as it may be called, of this Magnet, and its operations, are different. And so they are in some respects. There is here much additional machinery, and this instrument has some operations which the other has not.

"By this machinery the changes in polarity of the Magnet are effected, and thereby its repulsive as well as attractive power is employed, by which its alternate action is produced, which accomplishes the result. But how does this happen?

"In order to employ this repulsive power, it became necessary to invent a contrivance to effect changes in the polarity of the Magnet; and to effect this, the two permanent Magnets are introduced, the two local circuits are added, and the alterations already mentioned were made in the Receiver of Mr. Morse;

and because these things had been done, it was contended that the instrument ought to be considered and adjudged substantially different.

"The machinery was necessary to effect the changes in the polarity of the Magnet, in order to bring into action the repulsive power, in addition to the attractive; but the employment of repulsion produces no substantial diversity, and yet the argument is, the machinery itself shall constitute an essential diversity.

"The attractive power of the Electro-Magnet is altogether sufficient to work any Telegraphic Register. The permanent Magnets are necessary only to employ the *repulsive* power, and *that* is useless; and if used, would not help the defendants to escape the charge of infringement; therefore, let them be removed, and all this machinery is at once wholly unnecessary. Let *it* be cast off, and the corresponding alterations of the Receiving Magnet are rendered equally useless. Now, all these useless things discarded, we have nothing left but the simple Receiving Magnet of the patentee.

"One of the alternate motions of this Columbian Magnet does draw back the pen after it has made an indentation upon the paper, and holds it in position for repetition; but this is accomplished by Mr. Morse by a simple spring, and it was not pretended that all this machinery and repulsive power of the Magnet had been brought into action for any such purpose.

"*The grooved rollers*, in combination with the clockwork, seemed to have been used by the defendants for some time, and without disguise. In the instrument exhibited here, there is a third *cylinder* introduced, over which the paper is made to pass, by the action of the two rollers, such as those found in the instrument of Mr. Morse. This is only an addition, which can give no right to use the thing to which it is added, and it is not supposed that it constitutes any improvement.

"*The Pen Lever* is the next thing. It was in proof that, shortly before the hearing of this motion commenced, the contrivance employed was somewhat different.

"This bar, which is here attached to the Electro-Magnet, on the other end of which is the sharp point which makes the indentations of intelligence upon the paper, was, in the instrument then employed, made fast to one end of the Pen Lever, which lever was bent in an angle somewhat greater than a right angle, and worked upon an axis or fulcrum at the angle; the other end, to which the armature was made fast, descending perpendicularly, or nearly so, from the fulcrum.

"The vibration of the armature, to and fro, carried this end of the pen lever with it, bringing the point, fixed in the other

end of the lever, in contact with the paper, and withdrawing it alternately, thus writing by the lever motion.

"This is unimportant, except to manifest in what a variety of forms every instrument in this Telegraph may be constructed, and to show how industrious and ingenious the inventors of this instrument of the defendants have been, in devising modes by which to obtain the benefit of the discoveries of the patentee, and yet evade the charge of an infringement of his rights.

"The effort here has, perhaps, as much the appearance of being successful as anywhere else, but it cannot prevail.

"In the Register of the patentee, the attraction of the armature on one end of the pen lever, downwards, gives an upward action to the other end, and thereby the indentations are made upon the paper. Here, by this last contrivance, the pen lever is made a part of the magnet, which, by its vibration, gives the same action to the pen; and such a difference in the mode of accomplishing such an end, can be regarded as no better than a substitution of one mechanical contrivance or arrangement for another, which can succeed only when such arrangement is the very essence of the invention, and without which it could not be said anything had been discovered. * * * *

THE COLUMBIAN INFRINGES ON MORSE.

"The conclusion is, that the employment of the Columbian Telegraph, in any of the forms which it appears to have assumed, would have been an infringement of the rights of the complainants, even had less of the sameness been found in their several parts. And this disposes of the question of infringement."

APPLICATION FOR INJUNCTION.

This judicial examination took place in 1848, commencing on the 24th day of August, and terminating on the 9th day of September. The complainants were Messrs. Morse, Vail, and Smith, against Henry O'Rielly and others. The former applied for an injunction against the O'Rielly or People's Line, extending south of Louisville. After the most tedious examination of the questions at issue, the Honorable Judge, sitting in Chamber, gave his opinion, fully sustaining the Morse Patents, in which was embraced the preceding descriptions of the Columbian Telegraph, and he closed his masterly examination by entering an order of injunction, containing the following, viz. :—

INJUNCTION AWARDED.

"You, Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings, are therefore—as by the order of our said Judge in the premises is directed—*Enjoined* and commanded, that you, and

each of you, your servants and agents, do henceforth desist and refrain from all further employment, in the District of Kentucky, of the Electro-Magnetic Telegraph in the complainants' bill mentioned; which, it appears by the proofs, was, by you, the defendants, lately employed, *and*, of the Telegraph by the defendant, O'Rielly, in his answer mentioned, which is by you called 'The Columbian Telegraph;' and which, it appeared, you proposed to employ hereafter—but which *two* are considered here, for the purpose of this matter, as *one* and the same Telegraph—in the transmission of intelligence from one place to another distant place by making thereat a legible record thereof: and from such employment for such purpose of any other Telegraph worked by the motive power of Electro-Magnetism, and consisting of combined circuits of electricity, connected by what is called, by the complainants, the *Receiver*, and by you, the defendants, the *Mutator*, and the Register, worked by Electro-Magnetism, in whole or in part, or in any combination whatever, within, and in violation of the exclusive rights, as here determined, granted by letters patent to the complainant, Samuel F. B. Morse, until the further order of the Court, or until the effect of the said order of our Judge, at his Chambers, shall have expired."

INJUNCTION PERPETUATED.

At the fall term of the Circuit Court, the following order, perpetuating the injunction, was entered by the Honorable Court:—

"*It was ordered*, that the injunction granted herein, by the District Judge at his Chambers, be continued, until the further order of the Court."

INJUNCTION EVADED.

Early after the injunction was granted, the defendants sought other means to evade the Morse Patents, by receiving intelligence by sound. Complaint was made to the Judge, and writs for the arrest of the parties were issued. On the hearing, the Judge entered the following, viz.:—

"*It is considered by the Court*, that the operations of the Telegraph of the defendants, O'Rielly and others, in the writ of injunction mentioned, by the said Barnes, in the transmission of intelligence from the city of Louisville, within the District of Kentucky, to Nashville, without the District, by making at that place, the record thereof in the Telegraphic characters indented upon the paper, off which it was put into the manuscript for the correspondents, was a palpable violation of the injunction; and that his operation of the same Telegraph in receiving intelligence from Nashville at Louisville in and by the sounds made by the same action of the Telegraph, which, in its regular operation, would have made the record in the Telegraphic characters in

dented upon the paper, and therefrom putting the same into manuscript for the correspondents, was a mere evasion of the injunction, and substantially a violation thereof, and of the vested rights of the complainants."

SECOND EVASION OF INJUNCTION.

Not satisfied with the order in the above case, placing the parties under bonds for contempt of Court, the defendant sought another mode to evade the patents and the injunction. Complaint was made to the Judge, and the following is a part of the proceedings in the case, viz. :—

"The Court stated the matter, and delivered its judgment in case of the attachment against Zook and Woolfolk.

"'*The short statement of the case* is, that the defendants, after being prohibited the employment of their Telegraph within the District of Kentucky, removed the instruments of their office to Jeffersonville, without the District, but still kept their posts and wires within it, and with their Telegraph so situated, partly within the District, and partly without it, continued their prohibited operations, in violation of the injunction; and in order to still have the benefit of the transmission of intelligence to and from Louisville, established a post-office in the city, and a regular mail from it, to their office in Jeffersonville, in violation of the prohibition of the injunction and of act of Congress, prohibiting the establishment of private mails. It is difficult to see how any person could have imagined that the law or judgment of a court could be thus evaded, or how they could have supposed it was justifiable to adopt such means of accomplishing such an end.

"'*It is found*, on proofs, that S. K. Zook was the superintendent of the line of Telegraphs of the defendants from Louisville to Nashville, and as such had under them the power over it, and their agents employed in its operations; and that after the proceeding had herein against Barnes, and the defendants had absented themselves from the District, caused the line of wires to be extended from Louisville to Jeffersonville, Indiana, without the District of Kentucky, and caused the instruments of the Telegraph Office in Louisville, the use whereof the defendants, O'Rielly and others, had been prohibited, by this injunction, to be removed across the Ohio to that place; and thereupon, as such superintendent caused the Telegraph of the defendants, with the position of a portion of the instruments so changed, to be put in operation and conducted in a mode within the prohibitions of the writ of injunction against his principals.

"'It appears that the same office of the defendants in Louisville was still occupied, and that all communications to be trans-

mitted thence were received thereat, and thence transferred by the carriers and servants of the defendants to Jeffersonville, whence they were accordingly dispatched on this Telegraph, so situated, in part, within this District; and it seems to the Court, that such change of the position of a portion of the instruments was but an attempt to evade the injunction, and that such operations of the Telegraph, with the instruments, partly within the District, the use whereof within it had been prohibited by the injunction, was a violation thereof, and this party, S. K. Zook, is guilty of the contempt wherewith he is charged. And,

"'*It is ordered*, that the said S. K. Zook, for his offence aforesaid, make his fine to the United States, by the payment of the sum of two hundred and fifty dollars, and also the costs in this proceeding expended, and that he stand committed, and be confined in the jail of the county of Franklin, State of Kentucky, until the same shall have been paid, or he shall be discharged by due course of law.'"

The same order of Court was given in the case of Mr. Woolfolk, and both placed under bonds. They were released from the fine.

THE UNITED STATES MARSHAL SEIZES THE LINE.

The repeated efforts of the defendants to evade the injunction, and act in contempt of the Court, induced the entering of the following order, which terminated the ability of the parties to abuse the privilege given them to take charge of their line :—

"'*It is ordered*, that the Marshal be, and he is hereby directed to take into his possession such parts of the line of wires and posts of the Telegraph of the defendants, within the District of Kentucky, as may be necessary for the purpose herein presently expressed, and by *breaking and intercepting the circuit of Electricity through the wires, stop and prevent the defendants from further operations upon their Telegraph, within the District, in any mode prohibited by the injunction herein ;* but in doing this he will take such possession of no part of such wires or posts which shall not be necessary for him to have in his custody to effect and secure this object, but will leave the other parts thereof in possession, or under the superintendence of the defendants or their agents, as he may find them ; and that he so hold the possession of such parts of the Telegraph, and thereby prevent the violation of the injunction until this cause shall be fully heard, or the further order of the Court.'"

The Marshal executed this order of the Court, and thus ended the inventive powers of evasion.

APPEAL TO THE SUPREME COURT.

It was upon the proceedings above recited that Mr. O'Rielly

appealed to the Supreme Court of the United States, and upon which the annexed decision was rendered by Chief Justice Taney, and the dissenting opinion by Justice Grier.

THE BAIN CHEMICAL TELEGRAPH.

After the proceedings in the District Court of Kentucky took place, Mr. O'Rielly proposed to put on the People's Line aforesaid the Bain Chemical Telegraph, and he applied to the Court for possession of the Line. The Morse counsel resisted the application, contending that it would be another violation of the patents. The Court decided that the question was upon its *violation of the injunction* granted. The decree of the Court was against the Columbian Telegraph—an Electro-Magnetic Telegraph—and the Bain system was a Chemical Telegraph, which was not considered in the former trial. Whether or not it was a violation of the patents of Prof. Morse, could only be ascertained by a separate action thereon. Such was the opinion of the Honorable Court. The Line was then given in charge of the defendants, they giving bond and security not to put on the said Line any instrument *infringing the patents granted to Morse.*

THE FINALE OF THE LINE.

The Line was then worked by the Bain system. Mr. O'Rielly having made an assignment, the Line was placed in charge of trustees, and ultimately under a corporate control. With the utmost difficulty it was continued at work, each year increasing its debt, until June, 1852, when it became blended in management with the Morse Line. The two combined cleared about $30,000 for the year, which was applied in the payment of old debts. June, 1853, the two companies consolidated and became one, the Morse Company taking the other at an agreed valuation, assuming the debts, amounting to some $40,000 or $45,000, the combined debt being about $70,000. Such is the history of these two Lines, both groaning under a heavy debt. One good Line could have accumulated handsome gains. Free the present Company from debt, and the stock will pay large dividends. It is not with pride that we refer to these reminiscences. To all it is a sad tale. No one has been benefited, but it has been a sip of gall to each and every one who has been connected with the cause and the contest.

VOTE IN THE SUPREME COURT.

Before closing our remarks upon this question, we desire to give a statement of the case in the Supreme Court, for general information.

The opinion of the Court was read by Chief Justice Taney,

which was concurred in by Justices McLean, Catron, and Daniel. The dissenting opinion was read by Justice Grier, and concurred in by Justices Nelson and Wayne. Justice Curtis, having been a Morse counsel, did not sit in the case. Justice Campbell, having been appointed since the argument, did not sit in the case.

CONCLUSION.

We close this article by giving the claims of the Morse patents. The preceding pages give the history of the controversy as briefly as possible; also, the points of the opinion of the Court below pertaining to the Columbian Telegraph, the efforts to evade the solemn decrees of the judiciary, and the finale of the Line.

In making reference to the history of the above case, we have endeavored to avoid exhibiting any personal allusion disrespectful of the parties. We respect them all, and regret the existence of past and present troubles. The controversy is now at an end, and whatever pride or mortification either or any of us may have had, we hope will be buried forever, and our future career be marked with well-directed consideration in the acquirement of food to eat and raiment to wear.

PATENT 1840—RE-ISSUED 1848.

"'Be it known that I, Samuel F. B. Morse, now of * * * the State of New-York, have invented a new and useful apparatus for, and a system of transmitting intelligence between distant points by means of Electro-Magnetism, which puts in motion machinery for producing *sounds* or *signs*, and *recording* said signs upon paper or other suitable material, which invention I denominate the American Electro-Magnetic Telegraph, and that the following is a full, clear, and exact description of the principle or character thereof, which distinguishes it from all other Telegraphs previously known; and of the manner of making and constructing said apparatus, and of applying said system, reference being had to the accompanying drawing, making part of this specification. * * * * *

CLAIMS.

"'First. Having thus fully described my invention, I wish it to be understood that I do not claim the use of the Galvanic current, or current of Electricity, for the purpose of Telegraphic communications generally; but what I specially claim as my invention and improvement, is making use of the motive power of Magnetism, when developed by the action of such current or currents, substantially as set forth in the foregoing description of the first principal part of my invention, as means of operating or giving motion to machinery, which may be used to IMPRINT signals upon paper or other suitable material, or to produce

sounds in any desired manner, for the purpose of Telegraphic communication at any distances.

"'The only ways in which the Galvanic currents had been proposed to be used, prior to my invention and improvement, were by bubbles resulting from decomposition, and the action or exercise of electrical power upon a magnetized bar or needle; and the bubbles and deflections of the needles, thus produced, were the subjects of inspection, and had no power, or were not applied to record the communication. I therefore characterize my invention as the first RECORDING or PRINTING Telegraph by means of Electro-Magnetism.

"'There are various known modes of producing motion by Electro-Magnetism, but none of these had been applied prior to my invention and improvement, to actuate or give motion to PRINTING or RECORDING *machinery*, which is the chief point of my invention and improvement.

"'Second. I also claim as my invention and improvement the employment of the machinery called the Register or Recording Instrument, composed of the train of clock wheels, cylinders and other apparatus, or their equivalent, for moving the material upon which the characters are to be imprinted, and for imprinting said characters, substantially as set forth in the foregoing description of the second principal part of my invention.

"'Third. I also claim as my invention and improvement, the combination of machinery herein described, consisting of the generator of Electricity, the circuit of conductors, the contrivance for closing and breaking the circuit, the Electro-Magnet, the pen or contrivance for marking, and the machinery for sustaining and moving the paper, altogether constituting one apparatus or Telegraphic machine, which I denominate the *American Electro-Magnetic Telegraph.*

"'Fourthly. I also claim as my invention the combination of two or more Galvanic or Electric circuits, with independent batteries, substantially by the means herein described, for the purpose of obviating the diminished force of Electro-Magnetism in long circuits, and enabling me to command sufficient power to put in motion Registering or Recording machinery at any distances.

"'Fifthly. I claim, as my invention, the system of signs, consisting of dots and spaces, and of dots, spaces and horizontal lines, for numerals, letters, words, or sentences, substantially as herein set forth and illustrated, for Telegraphic purposes.

"'Sixth. I also claim, as my invention, the system of signs, consisting of dots and spaces, and of dots, spaces, and horizontal lines, substantially as herein set forth and illustrated, in combination with machinery for recording them, as signals for Telegraphic purposes.

"'Seventh. I also claim, as my invention, the types, or their equivalent, and the Type Rule and port rule, in combination with the signal lever or its equivalent, as herein described, for the purpose of breaking and closing the circuit of Galvanic or Electric conductors.

"'Eighth. *I do not propose to limit myself to the specific machinery, or parts of machinery, described in the foregoing specifications and claims: the essence of my invention being the use of the motive power of the Electric or Galvanic current, which I call Electro-Magnetism, however developed, for marking or printing intelligible characters, letters, or signs, at any distances, being a new application of that power, of which I claim to be the first inventor or discoverer.*'"

PATENT 1846—RE-ISSUED 1848.

"This patent is the reissue of the patent of April, 1846, and is for a new and useful improvement in '*Electro-Magnetic Telegraphs.*' It grants the exclusive use to the patentee for the term of fourteen years from the eleventh day of April, 1846, * * *

OBJECT OF THE INVENTION.

"'The original and final object of all Telegraphing is the communication of intelligence at a distance by signs or signals.

"'Various modes of Telegraphing, or making signs or signals at a distance, have for ages been in use. The signs employed heretofore have had one quality in common. They are *evanescent*—shown or heard a moment, and leaving no trace of their having existed. The various modes of these evanescent signs have been by *beacon fires* of different characters, by *flags*, by *balls*, by *reports of fire-arms*, by bells heard from a distant position, by *movable arms from posts*, *&c.*

"'I do not, therefore, claim to be the inventor of Telegraphs generally. The Electric Telegraph is a more recent kind of Telegragh, proposed within the last century, but no practical plan was devised until about sixteen years ago. Its distinguishing feature is the employment of Electricity to effect the same general result of communicating intelligence at a distance by signs or signals.

"'The various modes of accomplishing this end by Electricity have been:—

"'The employment of common or machine Electricity as early as 1787, to show an evanescent sign by the *divergence of pith-balls.*

"'The employment of common or machine Electricity in 1794, to show an evanescent sign by the Electric spark.

"'The employment of Voltaic Electricity in 1809, to show an

evanescent sign by the *evolution of gas-bubbles*, decomposed from solution in a vessel of transparent glass.

"'The employment of Voltaic Electricity in the production of temporary Magnetism in 1820, to show an evanescent sign by *deflecting a magnet* or *compass-needle*.

"'The result contemplated from all these Electric Telegraphs was the production of *evanescent signs* or signals only.

"'I do not, therefore, claim to have first applied Electricity to Telegraphing for the purpose of showing evanescent signs or signals.

"'The original and final object of my Telegraph is, *to imprint characters at any distance as signals for intelligence;* its object is to *mark or impress them in a permanent manner.*

"'To obtain this end, I have applied Electricity in two distinct ways. 1st. I have applied, by a novel process, the *motive power of Electro-Magnetism, or Magnetism produced by Electricity, to operate machinery for printing* signals at any distance. 2dly. I have applied the *chemical effects* of Electricity to print signals at any distance. * * * * *

CLAIMS.

"'First. What I claim as my invention, and desire to secure by letters patent, is the employment, in a main Telegraphic circuit, of a device or contrivance called the Receiving Magnet, in combination with a short local independent circuit or circuits, each having a Register and Register Magnet, or other Magnetic contrivances for registering, and sustaining such a relation to the Register Magnet, or other Magnetic contrivances for registering, and to the length of circuit of Telegraphic line, as will enable me to obtain with the aid of a Galvanic battery and main circuit, and the intervention of a local battery and local circuit, such motion or power for registering as could not be obtained otherwise without the use of a much larger Galvanic battery, if at all.

"'Second. I also claim as my invention, the combination of the apparatus called the *self-stopping apparatus*, connected with the clockwork by the Register, for setting said Register in action, and stopping it with the Pen Lever F, as herein described.

"'Third. I also claim as my invention, the combination of the point or points of the pen and pen lever, or its equivalent, with the grooved roller, or other equivalent device, over which the paper, or other material suitable for marking upon, may be made to pass for the purpose of receiving the impression of the characters; by which means I am enabled to MARK or PRINT signs or signals upon paper or other fabric, by indentation, thus dispensing with the use of coloring matter for marking, as specified in my letters patent, of January 15th, 1846.'"

Art. II.—DECISION OF SUPREME COURT OF THE UNITED STATES.

SAMUEL F. B. MORSE *vs.* HENRY O'RIELLY.

This was an Appeal from the District Court of Kentucky, wherein Morse was granted an Injunction against O'Rielly, for an Infringement of the Morse Patents, by the use of the Columbian Telegraph. The Supreme Court perpetuates that Injunction.

Counsel for Morse.	*Counsel for O'Rielly.*
GEORGE GIFFORD, ST. GEO. T. CAMPBELL, GEORGE HARDING.	SOLOMON P. CHASE, R. H. GILLETT.

DECISION WAS RENDERED JAN. 30TH, 1854.

December Term, 1853.

HENRY O'RIELLY, EUGENE L. WHITMAN, and W. F. B. HASTINGS, Appellants, *versus* SAMUEL F. B. MORSE, ALFRED VAIL, and FRANCIS O. J. SMITH, Appellees.

Appeal from the Circuit Court of the United States for the District of Kentucky.

Chief Justice TANEY delivered the opinion, which was concurred in by Justices DANIEL, CATRON, and MCLEAN.

In proceeding to pronounce judgment in this case, the Court is sensible, not only of its importance, but of the difficulties in some of the questions which it presents for decision. The case was argued at the last Term, and continued over by the Court for the purpose of giving it a more deliberate examination. And since the continuance, we have received from the counsel on both sides printed arguments, in which all of the questions raised on the trial have been fully and elaborately discussed.

The appellants take three grounds of defence: In the first place, they deny that Professor Morse was the first and original inventor of the Electro-Magnetic Telegraphs, described in his two reissued patents of 1848. Secondly, they insist that if he was the original inventor, the patents under which he claims have not been issued conformably to the acts of Congress, and do not confer on him the right to the exclusive use. And thirdly, if these two propositions are decided against them, they insist that the Telegraph of O'Rielly is substantially different

from that of Professor Morse, and the use of it, therefore, no infringement of his rights.

In determining these questions, we shall, in the first instance, confine our attention to the patent which Professor Morse obtained in 1840, and which was reissued in 1848. The main dispute between the parties is upon the validity of this patent; and the decision upon it will dispose of the chief points in controversy in the other.

In relation to the first point, (the originality of the invention,) many witnesses have been examined on both sides.

It is obvious that, for some years before Professor Morse made his invention, scientific men in different parts of Europe were earnestly engaged in the same pursuit. Electro-Magnetism itself was a recent discovery, and opened to them a new and unexplored field for their labors, and minds of a high order were engaged in developing its power, and the purposes to which it might be applied.

Professor Henry, of the Smithsonian Institute, states in his testimony, that prior to the winter of 1819–20, an Electro-Magnetic Telegraph—that is to say, a Telegraph operating by the combined influence of electricity and magnetism—was not possible; that the scientific principles on which it is founded were until then unknown; and that the first fact of Electro-Magnetism was discovered by Oersted, of Copenhagen, in that winter, and was widely published, and the account everywhere received with interest.

He also gives an account of the various discoveries subsequently made from time to time, by different persons in different places, developing its properties and powers; and among them his own. He commenced his researches in 1828, and pursued them with ardor and success from that time until the Telegraph of Professor Morse was established and in actual operation. And it is due to him to say that no one has contributed more to enlarge the knowledge of Electro-Magnetism, and to lay the foundations of the great invention of which we are speaking, than the professor himself.

It is unnecessary, however, to give in detail the discoveries enumerated by him—either his own, or those of others. But it appears from his testimony, that very soon after the discovery made by Oersted, it was believed by men of science that this newly-discovered power might be used to communicate intelligence to distant places. And before the year 1823, Ampère, of Paris, one of the most successful cultivators of physical science, proposed to the French Academy a plan for that purpose. But his project was never reduced to practice. And the discovery made by Barlow, of the Royal Military Academy at Woolwich, England, in 1825, that the galvanic current greatly diminished

in power as the distance increased, put at rest for a time all attempts to construct an Electro-Magnetic Telegraph. Subsequent discoveries, however, revived the hope; and in the year 1832, when Professor Morse appears to have devoted himself to the subject, the conviction was general among men of science everywhere, that the object could, and, sooner or later, would be accomplished.

The great difficulty in their way was the fact that the galvanic current, however strong in the beginning, became gradually weaker as it advanced on the wire; and was not strong enough to produce a mechanical effect after a certain distance had been traversed. But encouraged by the discoveries which were made from time to time, and strong in the belief that an Electro-Magnetic Telegraph was practicable, many eminent and scientific men in Europe, as well as in this country, became deeply engaged in endeavoring to surmount what appeared to be the chief obstacle to its success. And in this state of things, it ought not to be a matter of surprise, that four different Magnetic Telegraphs, purporting to have overcome the difficulty, should be invented, and made public so nearly at the same time that each has claimed a priority; and that a close and careful scrutiny of the facts in each case is necessary to decide between them. The inventions were so nearly simultaneous, that neither inventor can be justly accused of having derived any aid from the discoveries of the other.

One of these inventors, Doctor Steinheil, of Munich, in Germany, communicated his discovery to the Academy of Science in Paris, on the 19th of July, 1838, and states in his communication that it had been in operation more than a year.

Another of the European inventors, Professor Wheatstone, of London, in the month of April, 1837, explained to Professors Henry and Bache, who were then in London, his plan of an Electro-Magnetic Telegraph, and exhibited to them his method of bringing into action a second galvanic circuit in order to provide a remedy for the diminution of force in a long circuit; but it appears by the testimony of Professor Gale, that the patent to Wheatstone & Cooke was not sealed until January 21, 1840, and their specification was not filed until the 21st of July, in the same year; and there is no evidence that any description of it was published before 1839.

The remaining European patent is that of Edward Davy. His patent, it appears, was sealed on the 4th of July, 1838, but his specification was not filed until January 4, 1839; and when these two English patents are brought into competition with that of Morse, they must take date from the time of filing their respective specifications. For it must be borne in mind that, as the law then stood in England, the inventor was allowed six

months to file the description of his invention after his patent was sealed, while, in this country, the filing of the specification is simultaneous with the application for patents.

The defendants contend that all, or at least some one of these European Telegraphs, were invented and made public before the discovery claimed by Morse; and that the process and method by which he conveys intelligence to a distance is substantially the same, with the exception only of its capacity for impressing upon paper the marks or signs described in the alphabet he invented.

Waiving, for the present, any remarks upon the identity or similitude of these inventions, the Court is of opinion that the first branch of the objection cannot be maintained, and that Morse was the first and original inventor of the Telegraph described in his specification, and preceded the three European inventions relied on by the defendants.

The evidence is full and clear that when he was returning from a visit to Europe, in 1832, he was deeply engaged upon this subject during the voyage; and that the process and means were so far developed and arranged in his own mind, that he was confident of ultimate success. It is in proof that he pursued these investigations with unremitting ardor and industry, interrupted occasionally by pecuniary embarrassments; and we think that it is established by the testimony of Professor Gale and others, that early in the spring of 1837, Morse had invented his plan for combining two or more Electric or Galvanic Circuits, with independent Batteries, for the purpose of overcoming the diminished force of Electro-Magnetism in long circuits, although it was not disclosed to the witness until afterwards; and that there is reasonable ground for believing that he had so far completed his invention, that the whole process, combination, powers, and machinery, were arranged in his mind, and that the delay in bringing it out arose from his want of means; for it required the highest order of mechanical skill to execute and adjust the nice and delicate work necessary to put the Telegraph into operation, and the slightest error or defect would have been fatal to its success. He had not the means at that time to procure the services of workmen of that character; and without their aid no model could be prepared which would do justice to his invention; and it moreover required a large sum of money to procure proper materials for the work. He, however, filed his caveat on the 6th of October, 1837, and on the 7th of April, 1838, applied for his patent, accompanying his application with a specification of his invention, and describing the process and means used to produce the effect. It is true that O'Rielly in his answer alleges that the plan by which he now combines two or more galvanic or electric currents, with independent bat-

teries, was not contained in that specification, but discovered and interpolated afterwards; but there is no evidence whatever to support this charge. And we are satisfied from the testimony, that the plan, as it now appears in his specification, had then been invented, and was actually intended to be described.

With this evidence before us, we think it is evident that the invention of Morse was prior to that of Steinheil, Wheatstone, or Davy. The discovery of Steinheil, taking the time which he himself gave to the French Academy of Science, cannot be understood as carrying it back beyond the months of May or June, 1837; and that of Wheatstone, as exhibited to Professors Henry and Bache, goes back only to April in that year. And there is nothing in the evidence to carry back the invention of Davy beyond the 4th of January, 1839, when his specification was filed, except a publication said to have been made in the *London Mechanics' Magazine*, January 20, 1838; and the invention of Morse is justly entitled to take date from early in the spring of 1837. And in the description of Davy's invention, as given in the publication of January 20, 1838, there is nothing specified which Morse could have borrowed; and we have no evidence to show that his invention ever was or could be carried into successful operation.

In relation to Wheatstone, there would seem to be some discrepancy in the testimony. According to Professor Gale's testimony, as before mentioned, the specification of Wheatstone and Cooke was not filed until July 21, 1840, and his information is derived from the *London Journal of Arts and Sciences*. But it appears by the testimony of Edward F. Barnes, that this Telegraph was in actual operation in 1839. And in the case of the Electric Telegraph Company *vs.* Brett & Little, 10 Common Pleas Reports, by Scott, his specification is said to have been filed Dec. 12, 1837. But if the last-mentioned date is taken as the true one, it would not make his invention prior to that of Morse. And even if it would, yet this case must be decided by the testimony in the record, and we cannot go out of it, and take into consideration a fact stated in a book of reports. Moreover, we have noticed this case merely because it has been pressed into the argument. The appellants do not mention it in their answer, nor put their defence on it. And if the evidence of its priority was conclusive, it would not avail them in this suit. For they cannot be allowed to surprise the patentee by evidence of a prior invention of which they gave him no notice.

But if the priority of Morse's invention was more doubtful, and it was conceded that in fact some one of the European inventors had preceded him a few months or a few weeks, it would not invalidate his patent. The act of Congress provides that when the patentee believes himself to be the first inventor, a

previous discovery in a foreign country shall not render his patent void, unless such discovery or some substantial part of it had been before patented or described in a printed publication.

Now we suppose no one will doubt that Morse believed himself to be the original inventor when he applied for his patent in April, 1838. Steinheil's discovery does not appear to have been ever patented, nor to have been described in any printed publication until July of that year. And neither of the English inventions are shown by the testimony to have been patented until after Morse's application for a patent, nor to have been so described in any previous publication as to embrace any substantial part of his invention. And if his application for a patent was made under such circumstances, the patent is good, even i in point of fact, he was not the first inventor.

In this view of the subject, it is unnecessary to compare the Telegraph of Morse with these European inventions, to ascertain whether they are substantially the same or not. If they were the same in every particular, it would not impair his rights. But it is impossible to examine them, and look at the process and the machinery and results of each, so far as the facts are before us, without perceiving at once the substantial and essential difference between them, and the decided superiority of the one invented by Professor Morse.

Neither can the inquiries he made, nor the information or advice he received from men of science, in the course of his researches, impair his right to the character of an inventor. No invention can possibly be made, consisting of a combination of different elements of power, without a thorough knowledge of the properties of each of them, and the mode in which they operate on each other. And it can make no difference in this respect whether he derives his information from books, or from conversation with men skilled in the science. If it were otherwise, no patent in which a combination of different elements is used, could ever be obtained. For no man ever made such an invention without having first obtained this information, unless it was discovered by some fortunate accident. And it is evident that such an invention as the Electro-Magnetic Telegraph could never have been brought into action without it. For a very high degree of scientific knowledge, and the nicest skill in the mechanic arts, are combined in it, and were both necessary to bring it into successful operation. And the fact that Morse sought and obtained the necessary information and counsel from the best sources, and acted upon it, neither impairs his rights as an inventor, nor detracts from his merits.

Regarding Professor Morse as the first and original inventor of the Telegraph, we come to the objections which have been made to the validity of his patent.

We do not think it necessary to dwell upon the objections taken to the proceedings upon which the first patent was issued, or to the additional specifications in the reissued patent of 1848. In relation to the first, if there was any alteration, at the suggestion of the Commissioner, it appears to have been in a matter of form rather than of substance; and as regards the second, there is nothing in the proof, or on the face of the reissued patent, to show that the invention therein described is not the same with the one intended to be secured by the original patent. It was reissued by the proper lawful authority, and it was the duty of the Commissioner of Patents to see that it did not cover more than the original invention. It must be presumed, therefore, that it does not, until the contrary appears. Variations from the description given in the former specification do not necessarily imply that it is for a different discovery. The right to surrender the old patent, and receive another in its place, was given for the purpose of enabling the patentee to give a more perfect description of his invention, when any mistake or oversight was committed in his first. It necessarily, therefore, varies from it. And we see nothing in the reissued patent that may not, without proof to the contrary, be regarded as a more careful description than the former one, explaining more fully the nice and delicate manner in which the different elements of power are arranged and combined together and act upon one another, in order to produce the effect described in the specification. Nor is it void because it does not bear the same date with his French patent. It is not necessary to inquire whether the application of Professor Morse to the Patent Office, in 1838, before he went to France, does or does not exempt his patent from the operation of the act of Congress upon this subject. For if it should be decided that it does not exempt it, the only effect of that decision would be to limit the monopoly to fourteen years from the date of the foreign patent. And in either case the patent was in full force at the time the injunction was granted by the Circuit Court, and when the present appeal stood regularly for hearing in this Court.

And this brings us to the exceptions taken to the specification and claims of the patentee in the reissued patent of 1848.

We perceive no well-founded objection to the description which is given of the whole invention and its separate parts, nor to his right to a patent for the first seven inventions set forth in the specification of his claims. The difficulty arises on the eighth.

It is in the following words:

"Eighth. I do not propose to limit myself to the specific machinery or parts of machinery described in the foregoing

specification and claims; the essence of my invention being the use of the motive power of the electric or galvanic current, which I call Electro-Magnetism, however developed, for marking or printing intelligible characters, signs, or letters, at any distances, being a new application of that power of which I claim to be the first inventor or discoverer."

It is impossible to misunderstand the extent of this claim. He claims the exclusive right to every improvement where the motive power is the electric or galvanic current, and the result is the marking or printing intelligible characters, signs, or letters, at a distance.

If this claim can be maintained, it matters not by what process or machinery the result is accomplished. For aught that we now know, some future inventor in the onward march of science may discover a mode of writing or printing at a distance, by means of the electric or galvanic current, without using any part of the process or combination set forth in the plaintiff's specification. His invention may be less complicated—less liable to get out of order—less expensive in construction and in its operation. But yet, if it is covered by this patent, the inventor could not use it, nor the public have the benefit of it, without the permission of this patentee.

Nor is this all. While he shuts the door against inventions of other persons, the patentee would be able to avail himself of new discoveries in the properties and powers of Electro-Magnetism which scientific men might bring to light. For he says he does not confine his claims to the machinery or parts of machinery which he specifies: but claims for himself a monopoly in its use, however developed, for the purpose of printing at a distance. New discoveries in physical science may enable him to combine it with new agents and new elements, and by that means attain the object in a manner superior to the present process, and altogether different from it. And if he can secure the exclusive use, by his present patent, he may vary it with every new discovery and development of the science, and need place no description of the new manner, process, or machinery, upon the records of the Patent Office. And when his patent expires, the public must apply to him to learn what it is. In fine, he claims an exclusive right to use a manner and process which he has not described, and indeed had not invented, and therefore could not describe when he obtained his patent. The Court is of opinion that the claim is too broad, and not warranted by law.

No one, we suppose, will maintain that Fulton could have taken out a patent for his invention of propelling vessels by steam, describing the process and machinery he used, and claimed under it the exclusive right to use the motive power of steam,

however developed, for the purpose of propelling vessels. It can hardly be supposed that under such a patent he could have prevented the use of the improved machinery which science has since introduced; although the motive power is steam, and the result is the propulsion of vessels. Neither could the man who first discovered that steam might, by a proper arrangement of machinery, be used as a motive power to grind corn or spin cotton, claim the right to the exclusive use of steam, as a motive power, for the purpose of producing such effects.

Again, the use of steam as a motive power in printing-presses is comparatively a modern discovery. Was the first inventor of a machine or process of this kind entitled to a patent, giving him the exclusive right to use steam as a motive power, however developed, for the purpose of marking or printing intelligible characters? Could he have prevented the use of any other press subsequently invented, where steam was used? Yet so far as patentable rights are concerned, both improvements must stand on the same principles. Both use a known motive power to print intelligible marks or letters; and it can make no difference, in their legal rights under the patent laws, whether the printing is done near at hand or at a distance. Both depend for success not merely upon the motive power, but upon the machinery with which it is combined. And it has never, we believe, been supposed by any one, that the first inventor of a steam printing-press was entitled to the exclusive use of steam, as a motive power, however developed, for marking or printing intelligible characters.

Indeed, the acts of the patentee himself are inconsistent with the claim made in his behalf. For in 1846 he took out a patent for his new improvement of local circuits, by means of which intelligence could be printed at intermediate places along the main line of the Telegraph; and he obtained a reissued patent for this invention in 1848. Yet in this new invention the electric or galvanic current was the motive power, and writing at a distance the effect. The power was undoubtedly developed by new machinery and new combinations. But if his 8th claim could be sustained, this improvement would be embraced by his first patent. And if it was so embraced, his patent for the local circuits would be illegal and void. For he could not take out a subsequent patent for a portion of his first invention, and thereby extend his monopoly beyond the period limited by law.

Many cases have been referred to in the argument, which have been decided upon this subject, in the English and American courts. We shall speak of those only which seem to be considered as leading ones. And those most relied on, and pressed upon the Court, in behalf of the patentee, are the cases which arose in England upon Neilson's patent for the introduction of

heated air between the blowing apparatus and the furnace in the manufacture of iron.

The leading case upon this patent is that of Neilson and others *vs.* Harford and others, in the English Court of Exchequer. It was elaborately argued, and appears to have been carefully considered by the Court. The case was this:—

Neilson in his specification described his invention as one for the improved application of air to produce heat in fires, forges, and furnaces, where a blowing apparatus is required. And it was to be applied as follows:—The blast or current of air produced by the blowing apparatus was to be passed from it into an air-vessel or receptacle made sufficiently strong to endure the blast; and through or from that vessel or receptacle by means of a tube, pipe, or aperture, into the fire: the receptacle to be kept artificially heated to a considerable temperature by heat externally applied. He then described in rather general terms the manner in which the receptacle might be constructed and heated, and the air conducted through it to the fire: stating that the form of the receptacle was not material, nor the manner of applying heat to it. In the action above mentioned for the infringement of this patent, the defendant, among other defences, insisted—that the machinery for heating the air and throwing it hot into the furnace was not sufficiently described in the specification, and the patent void on that account—and also, that a patent for throwing hot air into the furnace, instead of cold, and thereby increasing the intensity of the heat, was a patent for a principle, and that a principle was not patentable.

Upon the first of these defences the jury found that a man of ordinary skill and knowledge of the subject, looking at the specification alone, could construct such an apparatus as would be productive of a beneficial result sufficient to make it worth while to adapt it to the machinery in all cases of forges, cupolas, and furnaces, where the blast is used.

And upon the second ground of defence, Baron Parke, who delivered the opinion of the Court, said:—

"It is very difficult to distinguish it from the specification of a patent for a principle, and this at first created in the minds of the Court much difficulty; but after full consideration, we think that the plaintiff does not merely claim a principle, but a machine embodying a principle, and a very valuable one. We think the case must be considered as if the principle being well known, the plaintiff had first invented a mode of applying it by a mechanical apparatus to furnaces; and his invention then consists in this: by interposing a receptacle for heated air between the blowing apparatus and the furnace. In this receptacle he directs the air to be heated by the application of heat externally to the receptacle, and thus he accomplishes the object of apply-

ing the blast, which was before cold air, in a heated state to the furnace."

We see nothing in this opinion differing in any degree from the familiar principles of law applicable to patent cases. Neilson claimed no particular mode of constructing the receptacle, or of heating it. He pointed out the manner in which it might be done; but admitted that it might also be done in a variety of ways; and at a higher or lower temperature; and that all of them would produce the effect in a greater or less degree, provided the air was heated by passing through a heated receptacle. And hence it seems that the Court at first doubted whether it was a patent for anything more than the discovery that hot air would promote the ignition of fuel better than cold. And if this had been the construction, the Court, it appears, would have held his patent to be void; because the discovery of a principle in natural philosophy or physical science is not patentable.

But after much consideration, it was finally decided that this principle must be regarded as well known, and that the plaintiff had invented a mechanical mode of applying it to furnaces; and that his invention consisted in interposing a heated receptacle between the blower and the furnace, and by this means heating the air after it left the blower, and before it was thrown into the fire. Whoever, therefore, used this method of throwing hot air into the furnace, used the process he had invented, and thereby infringed his patent, although the form of the receptacle or the mechanical arrangements for heating it might be different from those described by the patentee. For whatever form was adopted for the receptacle, or whatever mechanical arrangements were made for heating it, the effect would be produced in a greater or less degree, if the heated receptacle was placed between the blower and the furnace, and the current of air passed through it.

Undoubtedly the principle that hot air will promote the ignition of fuel better than cold, was embodied in this machine. But the patent was not supported, because this principle was embodied in it. He would have been equally entitled to a patent, if he had invented an improvement in the mechanical arrangements of the blowing apparatus, or in the furnace, while a cold current of air was still used. But his patent was supported, because he had invented a mechanical apparatus, by which a current of hot air instead of cold could be thrown in. And this new method was protected by his patent. The interposition of a heated receptacle in any form was the novelty he invented.

We do not perceive how the claim, in the case before us, can derive any countenance from this decision. If the Court of Exchequer had said that Neilson's patent was for the discovery that hot air would promote ignition better than cold, and that he had an exclusive right to use it for that purpose, there might,

perhaps, have been some reason to rely upon it. But the Court emphatically denied his right to such a patent; and his claim, as the patent was construed and supported by the Court, is altogether unlike that of the patentee before us.

For Neilson discovered that by interposing a heated receptacle between the blower and the furnace, and conducting the current of air through it, the heat in the furnace was increased. And this effect was always produced, whatever might be the form of the receptacle, or the mechanical contrivances for heating it, or for passing the current of air through it, and into the furnace.

But Professor Morse has not discovered that the electric or galvanic current will always print at a distance, no matter what may be the form of the machinery or mechanical contrivances through which it passes. You may use Electro-Magnetism as a motive power, and yet not produce the described effect—that is, print at a distance intelligible marks or signs. To produce that effect it must be combined with and passed through and operate upon certain complicated and delicate machinery adjusted and arranged upon philosophical principles, and prepared by the highest mechanical skill. And it is the high praise of Professor Morse, that he has been able by a new combination of known powers, of which Electro-Magnetism is one, to discover a method by which intelligible marks or signs may be printed at a distance. And for the method or process thus discovered he is entitled to a patent. But he has not discovered that the Electro-Magnetic current, used as a motive power, in any other method, and with any other combination, will do as well.

We have commented on the case in the Court of Exchequer more fully, because it has attracted much attention in the courts of this country as well as in the English courts, and has been differently understood. And perhaps a mistaken construction of that decision has led to the broad claim in the patent now under consideration.

We do not deem it necessary to remark upon the other English decisions in relation to Neilson's patent, nor upon the other cases referred to, which stand upon similar principles. The observations we have made on the case in the Court of Exchequer will equally apply to all of them.

We proceed to the American decisions; and the principles herein stated were fully recognized by this Court in the case of Leroy *et al. vs.* Tatham and others, decided at the last Term, 14 How., 156.

It appeared in that case that the patentee had discovered that lead, recently set, would, under heat and pressure in a close vessel, reunite perfectly after a separation of its parts, so as to make wrought instead of cast pipe. And the Court held that

he was not entitled to a patent for this newly-discovered principle or quality in lead; and that such a discovery was not patentable; but that he was entitled to a patent for the new process or method in the art of making lead pipe which this discovery enabled him to invent and employ; and was bound to describe such process or method fully in his specification.

Many cases have also been referred to which were decided in the Circuit Courts. It will be found, we think, upon careful examination, that all of them, previous to the decision on Neilson's patent, maintain the principles on which this decision is made. Since that case was reported, it is admitted that decisions have been made which would seem to extend patentable rights beyond the limits here marked out. As we have already said, we see nothing in that opinion which would sanction the introduction of any new principle in the law of patents; but if it were otherwise, it would not justify this Court in departing from what we consider as established principles in the American courts. And to show what was heretofore the doctrine upon this subject, we refer to the annexed cases. We do not stop to comment on them, because such an examination would extend this opinion beyond all reasonable bounds. 1 Stor. Rep. 270, 285; Wyeth *vs.* Stone, 3 Sumn. 540; Blanchard *vs.* Sprague. The first-mentioned case is directly in point.

Indeed, independently of judicial authority, we do not think that the language used in the act of Congress can justly be expounded otherwise.

The 5th section of the act of 1836 declares that a patent shall convey to the inventor, for a term not exceeding fourteen years, the exclusive right of making, using, and vending to others to be used, his invention or discovery, referring to the specification for the particulars thereof.

The 6th section directs who shall be entitled to a patent, and the terms and conditions on which it may be obtained. It provides that any person shall be entitled to a patent who has discovered or invented a new and useful art, machine, manufacture, or composition of matter, or a new and useful improvement on any previous discovery in either of them. But before he receives a patent, he shall deliver a written description of his invention or discovery, "*and of the manner and process of making, constructing, using, and compounding the same,*" in such exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound and use the same.

This Court has decided that the specification required by this law is a part of the patent, and that the patent issues for the invention described in the specification.

Now whether the Telegraph is regarded as an art or machine,

the manner and process of making or using it must be set forth in exact terms. The act of Congress makes no difference in this respect between an art and a machine. An improvement in the art of making bar iron or spinning cotton must be so described, and so must the art of printing by the motive power of steam. And in all of these cases, it has always been held that the patent embraces nothing more than the improvement described and claimed as new, and that any one who afterwards discovered a method of accomplishing the same object, substantially and essentially differing from the one described, had a right to use it. Can there be any good reason why the art of printing at a distance, by means of the motive power of the electric or galvanic current, should stand on different principles? Is there any reason why the inventor's patent should cover broader ground? It would be difficult to discover anything in the act of Congress which would justify this distinction. The specification of this patentee describes his invention or discovery, and the manner and process of constructing and using it, and his patent, like inventions in the other arts above mentioned, covers nothing more.

The provisions of the acts of Congress in relation to patents may be summed up in a few words.

Whoever discovers that a certain useful result will be produced in any art, machine, manufacture or composition of matter, by the use of certain means, is entitled to a patent for it; provided he specifies the means he uses in a manner so full and exact, that any one skilled in the science to which it appertains can, by using the means he specifies, without any addition to, or subtraction from, them, produce precisely the result he describes. And if this cannot be done by the means he describes, the patent is void. And if it can be done, then the patent confers on him the exclusive right to use the means he specifies to produce the result or effect he describes, and nothing more. And it makes no difference in this respect whether the effect is produced by chemical agency or combination; or by the application of discoveries or principles in natural philosophy, known or unknown before his invention; or by machinery acting altogether upon mechanical principles. In either case, he must describe the manner and process as above mentioned, and the end it accomplishes. And any one may lawfully accomplish the same end without infringing the patent, if he uses means substantially different from those described.

Indeed, if the 8th claim of the patentee can be maintained, there was no necessity for any specification, further than to say that he had discovered that by using the motive power of Electro-Magnetism, he could print intelligible characters at any distance. We presume it will be admitted on all hands that no

patent could have issued on such a specification. Yet this claim can derive no aid from the specification filed. It is outside of it, and the patentee claims beyond it. And if it stands, it must stand simply on the ground that the broad terms above mentioned were a sufficient description, and entitled him to a patent in terms equally broad. In our judgment, the act of Congress cannot be so construed.

The patent then being illegal and void, so far as respects the 8th claim, the question arises whether the whole patent is void, unless this portion of it is disclaimed in a reasonable time after the patent issued.

It has been urged on the part of the complainants that there is no necessity for a disclaimer in a case of this kind. That it is required in those cases only in which the party commits an error in fact, in claiming something which was known before, and of which he was not the first discoverer; that in this case he was the first to discover that the motive power of Electro-Magnetism might be used to write at a distance; and that his error, if any, was a mistake in law in supposing his invention, as described in his specification, authorized this broad claim of exclusive privilege; and that the claim, therefore, may be regarded as a nullity, and allowed to stand in the patent without a disclaimer, and without affecting the validity of the patent.

This distinction can hardly be maintained. The act of Congress above recited requires that the invention shall be so described, that a person skilled in the science to which it appertains, or with which it is most nearly connected, shall be able to construct the improvement from the description given by the inventor.

Now in this case there is no description but one of a process by which signs or letters may be printed at a distance. And yet he claims the exclusive right to any other mode and any other process, although not described by him, by which the end can be accomplished, if Electro-Magnetism is used as the motive power. That is to say, he claims a patent for an effect produced by the use of Electro-Magnetism distinct from the process or machinery necessary to produce it. The words of the act of Congress above quoted show that no patent can lawfully issue upon such a claim. For he claims what he has not described in the manner required by law. And a patent for such a claim is as strongly forbidden by the act of Congress as if some other person had invented it before him.

Why, therefore, should he be required and permitted to disclaim in the one case and not in the other? The evil is the same if he claims more than he has invented, although no other person has invented it before him. He prevents others from attempting to improve upon the manner and process which he

has described in his specification, and may deter the public from using it, even if discovered. He can lawfully claim only what he has invented and described, and if he claims more his patent is void. And the judgment in this case must be against the patentee, unless he is within the act of Congress which gives the right to disclaim.

The law which requires and permits him to disclaim is not penal, but remedial. It is intended for the protection of the patentee as well as the public, and ought not, therefore, to receive a construction that would restrict its operation within narrower limits than its words fairly import. It provides, "that when any patentee shall have in his specification claimed to be the first and original inventor or discoverer of any material or substantial part of the thing patented, of which he was not the first and original inventor, and shall have no legal or just claim to the same,"—he must disclaim in order to protect so much of the claim as is legally patented.

Whether, therefore, the patent is illegal in part, because he claims more than he has sufficiently described, or more than he invented, he must in either case disclaim, in order to save the portion to which he is entitled; and he is allowed to do so when the error was committed by mistake.

A different construction would be unjust to the public, as well as to the patentee, and defeat the manifest object of the law, and produce the very evil against which it intended to guard.

It appears that no disclaimer has yet been entered at the Patent Office. But the delay in entering it is not unreasonable. For the objectionable claim was sanctioned by the head of the office; it has been held to be valid by a Circuit Court, and differences of opinion in relation to it are found to exist among the justices of this Court. Under such circumstances, the patentee had a right to insist upon it, and not disclaim it until the highest court to which it could be carried had pronounced its judgment. The omission to disclaim, therefore, does not render the patent altogether void, and he is entitled to proceed in this suit for an infringement of that part of his invention which is legally claimed and described. But as no disclaimer was entered in the Patent Office before this suit was instituted, he cannot, under the act of Congress, be allowed costs against the wrong-doer, although the infringement should be proved. And we think it is proved by the testimony. But as the question of infringement embraces both of the reissued patents, it is proper, before we proceed to that part of the case, to notice the objections made to the second patent for the local circuits, which was originally obtained in 1846 and reissued in 1848.

It is certainly no objection to this patent, that the improvement is embraced by the eighth claim in the former one. We

have already said that this claim is void, and that the former patent covers nothing but the first seven inventions specifically mentioned.

Nor can its validity be impeached upon the ground that it is an improvement upon a former invention, for which the patentee had himself already obtained a patent. It is true that, under the act of 1836, S. 13, it was in the power of Professor Morse, if he desired it, to annex this improvement to his former specification, so as to make it from that time a part of the original patent. But there is nothing in the act that forbids him to take out a new patent for the improvement, if he prefers it. Any other inventor might do so; and there can be no reason, in justice or in policy, for refusing the like privilege to the original inventor. And when there is no positive law to the contrary, he must stand on the same footing with any other inventor of an improvement upon a previous discovery. Nor is he bound in his new patent to refer specially to his former one. All that the law requires of him is, that he shall not claim as new what is covered by a former invention, whether made by himself or any other person.

It is said, however, that this alleged improvement is not new, and is embraced in his former specification; and that if some portion of it is new, it is not so described as to distinguish the new from the old.

It is difficult, perhaps impossible, to discuss this part of the case so as to be understood by any one who has not a model before him, or perfectly familiar with the machinery and operations of the Telegraph. We shall not, therefore, attempt to describe minutely the machinery or its mode of operation. So far as this can be done intelligibly, without the aid of a model to point to, it has been fully and well done, in the opinion delivered by the learned Judge who decided this case in the Circuit Court. All that we think it useful or necessary to say is, that after a careful examination of the patents, we think the objection on this ground is not tenable. The force of the objection is mainly directed upon the receiving magnet, which, it is said, is a part of the machinery of the first patent, and performs the same office. But the receiving magnet is not of itself claimed as a new invention. It is claimed as a part of a new combination or arrangement to produce a new result. And this combination does produce a new and useful result. For by this new combination, and the arrangement and position of the receiving magnet, the local independent circuit is opened by the electric or galvanic current as it passes on the main line, without interrupting it in its course, and the intelligence it conveys is recorded almost at the same moment at the end of the line of the Telegraph and at the different local offices on its way. And it

hardly needs a model or a minute examination of the machinery to be satisfied that a Telegraph which prints the intelligence it conveys, at different places, by means of the current as it passes along on the main line, must necessarily require a different combination and arrangement of powers from the one that prints only at the end. The elements which compose it may all have been used in the former invention, but it is evident that their arrangement and combination must be different to produce this new effect. The new patent for the local circuits was, therefore, properly granted, and we perceive no well-founded objection to the specification or claim contained in the reissued patent of 1848.

The two reissued patents of 1848, being both valid, with the exception of the 8th claim in the first, the only remaining question is, whether they, or either of them, have been infringed by the defendants.

The same difficulty arises in this part of the case which we have already stated in speaking of the specification and claims in the patent for the local circuits. It is difficult to convey a clear idea of the similitude or differences in the two Telegraphs to any one not familiarly acquainted with the machinery of both. The Court must content itself, therefore, with general terms, referring to the patents themselves for a more special description of the matters in controversy.

It is a well-settled principle of law, that the mere change in the form of the machinery (unless a particular form is specified as the means by which the effect described is produced), or an alteration in some of its unessential parts, or in the use of known equivalent powers, not varying essentially the machine, or its mode of operation or organization, will not make the new machine a new invention. It may be an improvement upon the former, but that will not justify its use without the consent of the first patentee.

The Columbian (O'Rielly's) Telegraph does not profess to accomplish a new purpose or produce a new result. Its object and effect is to communicate intelligence at a distance, at the end of the main line and at the local circuits on its way. And this is done by means of signs or letters impressed on paper or other material. The object and purpose of the Telegraph is the same with that of Professor Morse.

Does he use the same means? Substantially, we think he does, both upon the main line and in the local circuits. He uses upon the main line the combination of two or more galvanic or electric circuits, with independent batteries, for the purpose of obviating the diminished force of the galvanic current, and in a manner varying very little in form from the invention of Professor Morse And, indeed, the same may be said of the

entire combination set forth in the patentee's third claim. For O'Rielly's can hardly be said to differ substantially and essentially from it. He uses the combination which composes the Register, with no material change in the arrangement, or in the elements of which it consists; and with the aid of these means he conveys intelligence, by impressing marks or signs upon paper; these marks or signs being capable of being read and understood by means of an alphabet, or signs adapted to the purpose. And as regards the second patent of Professor Morse, for the local circuits, the mutator of the defendant does not vary from it in any essential particular. All of the efficient elements of the combination are retained, or their places supplied by well-known equivalents. Its organization is essentially the same.

Neither is the substitution of marks and signs differing from those invented by Professor Morse any defence to this action. His patent is not for the invention of a new alphabet, but for a combination of powers composed of tangible and intangible elements, described in his specification, by means of which marks or signs may be impressed upon paper at a distance, which can there be read and understood. And if any marks, or signs, or letters are impressed in that manner, by means of a process substantially the same with his invention, or with any particular part of it covered by his patent, and those marks or signs can be read, and thus communicate intelligence, it is an infringement of his patent. The variation in the character of the marks would not protect it, if the marks could be read and understood.

We deem it unnecessary to pursue further the comparison between the machinery of the patents. The invasion of the plaintiff's rights, already stated, authorized the injunction granted by the Circuit Court, and so much of its decree must be affirmed. But for the reasons hereinbefore assigned, the complainants are not entitled to costs, and that portion of the decree must be reversed, and a decree passed by this Court, directing each party to pay his own costs in this and in the Circuit Court.

Art. III.—DISSENTING OPINION OF JUSTICE GRIER.

SUPREME COURT OF THE UNITED STATES,

December Term, 1853.

HENRY O'RIELLY, *et al.*, Appellants,

vs.

SAMUEL F. B. MORSE, *et al.*, Appellees.

Appeal from the Circuit Court of the United States for the District of Kentucky.

The opinion of Justice GRIER, concurred in by Justices NELSON and WAYNE.

I entirely concur with the majority of the Court that the appellee and complainant below, Samuel F. B. Morse, is the true and first inventor of the recording telegraph, and the first who has successfully applied the agent or element of nature, called electro-magnetism, to printing, and recording intelligible characters at a distance; and that his patent of 1840, finally reissued in 1848, and his patent for his improvements, as reissued in the same year, are good and valid; and that the appellants have infringed the rights secured to the patentee by both his patents. But, as I do not concur in the views of the majority of the Court, in regard to two great points of the case, I shall proceed to express my own.

I.—Does the complainant's first patent come within the proviso of the sixth section of the act of 1839; and should the term of fourteen years, granted by it, commence from the date of his patent here, or from the date of his French patent in 1838?

If the complainant's patent is within the provisions of this section, I cannot see how we can escape from declaring it void. The proviso declares, that "in all cases every *such patent* (issued under the provisions of that section) shall be limited to the term of fourteen years from the date or publication of such foreign letters patent." It is true it does not say that the patent shall be void if not limited to such term on its face; but it gives no power to the officer to issue a patent for a greater term. If the patent does not show the true commencement of the term granted by it, the patentee has it in his power to deceive the public by claiming a term of fourteen years, while in reality it may be not more than one.

But, I am of opinion, that the patent in question does not come within this proviso. The facts of the case, as connected with this point, are these: On the 6th of October, 1837, Morse filed, in the office of the Commissioner of Patents, a caveat, accompanied by a specification, setting forth his invention, and praying that it may be protected till he could finish some experiments necessary to perfect its details. On the 9th of April, 1838, he filed a formal application for a patent, accompanied by a specification and drawings. On the

1st of May, 1838, the Commissioner informs him *that his application has been granted.* Morse answers on the 15th of May, that he is just about to sail for Europe, and asks the Commissioner to delay the issue of his patent for the present, fearing its effect upon his plans abroad.

On the 30th of October, 1838, he obtained his useless French patent. On his return to this country, in 1840, he requests his patent to be perfected and issued. In his application filed on 9th of April, 1838, there was an oversight in filling up the day and month. This clerical omission was wholly immaterial, but *ex majori cautela*, a second affidavit was filed, and the patent issued on the 20th of June, 1840, for the term of 14 years from its date.

The application of 1838 had a set of drawings annexed to the specification. The second set of drawings required by the 6th section of the act of 1837, being for the purpose of annexation to the patent, they were entirely unnecessary till the patent issued, and are not required by law to accompany the application when first made, and the want of them cannot affect the validity of the application.

In many instances, owing to various causes, the patent is not issued till many months, and sometimes a year or more after the application. The Commissioner requires time to examine the specification ; he may suggest difficulties and amendments ; and disputes often arise which delay the issuing of the patent. But the application does not require to be renewed, and is never considered abandoned in consequence of such delay. It still remains as of the date of its filing for every purpose beneficial to the applicant. The law does not require that the specification and its accompaniments should be in the precise form which they afterwards assume in the patent. It requires only that the application be "*in writing*," and that the applicant should "make oath that he is the original inventor," &c. The other requirements of the act must precede the issuing of the patent, but make no part of the application, and are not conditions precedent to its validity. In the present case, we have, therefore, a regular application in due form, accompanied by a specification and drawings, filed on the 9th of April, 1838. It has not been withdrawn, discontinued, or abandoned. There is nothing in the act of Congress which requires that the patent should be issued within any given time after the application is filed, or which forbids the postponement of it for a time at the suggestion either of the applicant or the officer ; nor is there any thing in the general policy of the patent laws which forbids it. On the contrary, it has always been the practice, when a foreign patent is desired, to delay the issuing of the patent here, after application filed, for fear of injuring such foreign application. It forms no part of the policy of any of our patent acts to prevent our citizens from obtaining patents abroad. By the Patent Act of 1793, the applicant must swear that his invention was not known or used *before the application*. The filing of the application was the time fixed for determining the applicant's right to a patent. If a patent had issued abroad, or the invention had been in use or described in some public work *before that time*, it was a good defence to it. The time of filing the application was, therefore, made by law the criterion of his right to claim as *first inventor*.

A foreign patent, subsequent to the date of his application, could not be set up as a defence against the domestic patentee. The American inventor, who had filed his application and specification at home, was thus enabled to obtain his patent abroad without endangering his patent at home. This was a valuable privilege to American citizens, and one of which he has never been deprived by subsequent legislation; and thus the law stood till the act of 4th July, 1836.

Before this time, the right to obtain a patent was confined to American citizens, or those who had filed their intentions to become such. The policy of this act was to encourage foreign inventors to introduce their inventions to this country, but in doing so, it evinces no intention of limiting our own citizens by taking away from them rights which they had hitherto enjoyed. Accordingly, it gave an inventor, who had obtained a patent abroad, (and who was generally a foreigner,) a right to have one here, provided he made *his application* here within six months after the date of his foreign patent. Neither the letter nor the spirit of this act interferes with the right to an inventor, who has filed *his application* here, from obtaining a patent abroad, or his right to a term of fourteen years from the date of his patent.

In 1838, therefore, when complainant filed his application, he was entitled to such a patent. But in March, 1839, an act was passed, by the sixth section of which it is alleged the complainant's rights have been affected. That section is as follows :—"That no person shall be debarred from receiving a patent for any invention, &c., as provided in the act of 4th July, 1836, to which *this is additional*, by reason of the same having been patented in a foreign country more than six months prior to his application; *provided* that the same shall not have been introduced into public and common use in the United States prior *to the application for such patent*. *And provided, also*, that in all cases *every such patent* shall be limited to the term of fourteen years from the date or publication of such foreign letters patent." Now the act of 1836, as we have shown, had given a privilege to foreign patentees to have a patent within six months after date of such foreign patent; it had not affected, in any manner, the right previously enjoyed by American citizens to take out a foreign patent *after filing their application here*. This section gives "*additional*" rights to those who had first taken out patents abroad, and holds out an additional encouragement to foreign inventors to introduce their inventions here, subject to certain conditions contained in the provisoes. Neither the letter, spirit, nor policy of this act, have any reference to, or bearing upon, the case of persons who had first made their applications here. To construe a proviso, as applicable to a class of cases not within its enacting clause, would violate all settled rules of construction. The office of a proviso is either to except something from the enacting clause, or to exclude some possible ground of misinterpretation, or to state a condition to which the privilege granted by the section shall be subjected. Here the proviso is inserted, to restrain the general words of the section, and impose a condition on those who accept the privileges granted by the section. It enlarged the privileges of foreign patentees, which had before been confined to six months, on

two conditions : first, provided the invention patented abroad had not been introduced into public use here ; and secondly, on condition that *every such patent* should be limited in its term. The general words, "*in all cases*," especially when restrained to "*every such patent*," cannot extend the condition of the proviso beyond such cases as are the subject-matter of legislation in the section.

The policy and spirit of the act are to grant privileges to a certain class of persons which they did not enjoy before ; to encourage the introduction of foreign inventions and discoveries, and not to deprive our own citizens of a right heretofore enjoyed, or to affect an entirely different class of cases, when the *applications had been filed here before* a patent obtained abroad.

It is supposed that certain evils might arise by allowing an applicant for a patent here to delay its issue till he can obtain a foreign patent. To which it is a sufficient answer to say, that if such evil consequences should be found to exist, it is for Congress to remedy them by legislation. It is no part of the duty of this Court, by a forced construction of existing statutes, to attempt the remedy of possible evils by anticipation.

I am therefore of opinion that the complainant's patent, as renewed, contained a valid grant of the full term of fourteen years from its original date.

II.—The other point in which I cannot concur with the opinion of the majority, arises in the construction of the eighth claim of complainant's first patent, as finally amended. The first claim, as explanatory of all that follow, should be read in connection with the eighth—they are as follows :—"First—Having thus fully described my invention, I wish it to be understood that I do not claim the use of the galvanic current or currents of electricity for the purpose of telegraphic communications generally ; but what I specially claim as my invention and improvement, is making use of the motive power of magnetism, when developed by the action of such current or currents substantially as set forth in the foregoing description of the first principal part of my invention, as means of operating or giving motion to machinery which may be used to imprint signals upon paper or other suitable material, or to produce sounds in any desired manner for the purpose of telegraphic communication at any distances. The only ways in which the galvanic current had been proposed to be used prior to my invention and improvement, were by bubbles resulting from decomposition, and the action or exercise of electrical power upon a magnetized bar or needle ; and the bubbles and the deflections of the needles thus produced, were the subjects of inspection, and had no power, or were not applied to record the communication. I therefore characterize my invention as the first recording or printing telegraph by means of electro-magnetism.

"There are various known modes of producing motions by electro-magnetism, but none of these had been applied prior to my invention and improvement, to actuate or give *motion* to printing or recording machinery, which is the chief point of my invention and improvement."

"Eighth.—I do not propose to limit myself to the specific machinery or parts of machinery described in the foregoing specification and claims, the essence of my invention being the use of the motive power of the electric or galvanic current, which I call electro-magnetism, however developed, for marking or printing intelligible characters, signs or letters, at any distances, being a new application of that power, of which I claim to be the first inventor or discoverer."

The objection to this claim is, that it is *too broad*, because the inventor does not confine himself to specific machinery or parts of machinery as described in his patent, but claims that the essence of his invention consists in the application of electro-magnetism as a motive power, however developed, for printing characters at a distance. This being a new application of that element or power, of which the patentee claims to be the first inventor or discoverer.

In order to test the value of this objection as applied to the present case, and escape any confusion of ideas too often arising from the use of ill-defined terms and propositions, let us examine, 1st. What may be patented, or what forms a proper subject of protection under the Constitution and acts of Congress relative to this subject.

2d. What is the nature of the invention now under consideration? Is it a mere machine, and subject to the rules which effect a combination of mechanical devices to effect a particular purpose?

3d. Is the claim true in fact; and, if true, how can it be *too broad*, in any legal sense of the term, as heretofore used, either in the acts of Congress or in judicial decisions?

4th. Assuming the hypothesis that it is too broad; how should that affect the judgment for costs in this case?

"1st. The Constitution of the United States declares that Congress shall have the power to promote the progress of science and *useful arts*, by securing, for limited times, to authors and inventors, the exclusive right to their respective writings and *discoveries*."

The act of Congress of 1836 confers this exclusive right, for a limited time, on "any person who has discovered or invented any *new and useful art*, *machine*, *manufacture* or *composition of matter*, or any new and useful improvements on any *art*, machine, manufacture, or composition of matter, not known or used by others before his or their discovery or invention thereof, and not, at the time of his application for a patent, in public use," &c.

A new and useful *art*, or a new and useful improvement on any known art, is as much entitled to the protection of the law as a machine or manufacture. The English patent acts are confined to "manufactures," in terms; but the courts have construed them to cover and protect arts as well as machines; yet without using the term *art*. Here we are not required to make any latitudinous construction of our statute for the sake of equity or policy; and surely we have no right, even if we had the disposition, to curtail or narrow its liberal policy by astute or fanciful construction.

It is not easy to give a precise definition of what is meant by the term "*art*," as used in the acts of Congress. Some, if not all, the traits which distinguish an *art* from the other legitimate subjects of a

patent, are stated with clearness and accuracy by Mr. Curtis, in his treatise on patents. The term *art* "applies," says he, "to all those cases where *the application of a principle is the most important part of the invention*, and where the machinery, apparatus, or other means by which the principle is applied are incidental only, and not of the essence of his invention. It applies also to all those cases where the result, effect, or manufactured article, is old, but the invention consists in a new process or method of producing such result, effect, or manufacture." (Curt. Pat., 80.)

A machine, though it may be composed of many parts, instruments, or devices combined together, still conveys the idea of unity. It may be said to be invented, but the term "*discovery*" could not well be predicated of it. An art may employ many different machines, devices, processes, and manipulations, to produce some useful result. In a previously known art, a man may discover some new process, or new application of a known principle, element, or power of nature, to the advancement of the art; and will be entitled to a patent for the same, as an improvement in the art; or he may invent a machine to perform a given function, and then he will be entitled to a patent only for his machine. That improvements in the arts which consist in the new application of some known element, power, or physical law, and not in any particular machine or combination of machinery, have been frequently the subject of patents, both in England and this country, the cases in our books most amply demonstrate. I have not time to examine them at length; but would refer to James Watt's patent for a method of saving fuel in steam-engines, by condensing the steam in separate vessels, and applying non-conducting substances to his steam-pipes; Clegg's patent for measuring gas in water—Jupe *vs.* Pratt: Webster's Pat. Cases, 103—and the celebrated case of Neilson's patent for the application of hot blast, being an important improvement in the art of smelting iron.

In England, where their statute does not protect an art in direct terms, they have made no clear distinction between an art and an improvement in an art, and a process, machine or manufacture. They were hampered and confined by the narrowness of the phraseology of their patent acts. In this country the statute is as broad as language can make it; and yet if we look at the titles of patents as given at the Patent Office, and the language of our courts, we might suppose that our statute was confined entirely to *machines*, notwithstanding in Knoop *vs.* The Bank (4 Washington, C. C. R. 19), Mr. Justice Washington supported a patent which consisted in nothing else but a new application of copper plates to both sides of a bank bill as a security against counterfeiting. The new application was held to be an *art*, and therefore patentable. So the patent in McClurg *vs.* Kingsland (1 How. 204) was in fact for an improvement in the art of casting chilled rollers by conveying the metal to the mould in a direction approaching to the tangent of the cylinder, yet the patentee was protected in the principle of his discovery (which was but the application of a known law of nature to a new purpose) against all forms of machinery embodying the same principle. The great art of printing, which

has changed the face of human society and civilization, consisted in nothing but a new application of principles known to the world for thousands of years; no one could say it consisted in the type or the press, or in any other machine or device used in performing some particular function more than in the hands which picked the types or worked the press. Yet if the inventor of printing had, under this narrow construction of our patent law, claimed his *art* as something distinct from the machinery, the doctrine now advanced would have declared it unpatentable to its full extent as an *art*, and that the inventor could be protected in nothing but his first rough types and ill-contrived press.

I do not intend to review the English cases which adopt the principle for which I now contend, notwithstanding their narrow statute. But would refer to the opinion of my brother Nelson, in 14 How. 177; and will add, that Mr. Justice McLean, in delivering the opinion of the Court in that case, quotes with approbation the language of Lord Justice Clerk in the Neilson case, which is precisely applicable to the question before us. He says, "The specification does not claim anything as to form, nature, shape, materials, numbers or mathematical character of the vessel or vessels, in which the air is to be heated, or as to the mode of heating such vessels." Yet this patent was sustained as for a new application of a known element, or to use correct language, as an improvement in the art of smelting iron, without any regard to the machinery or parts of machinery used in the application. —Such I believe to be the established doctrine of the English courts.

He who first discovers that an element or law of nature can be made operative for the production of some valuable result, some new art, or the improvement of some known art, who has devised the machinery or process to make it operative, and introduced it in a practical form to the knowledge of mankind, is a discoverer and inventor of the highest class. The discovery of a new application of a known element or agent may require more labor, expense, persevering industry and ingenuity than the invention of any machine; sometimes, it is true, it may be the result of a happy thought or conception, without the labor of experiment, as in the case of the improvement in the art of casting chilled rollers, already alluded to. In many cases it is the result of numerous experiments; not the consequence of any reasoning *a priori*, but wholly empyrical, as in the discovery that a certain degree of heat, when applied to the usual processes for curing India rubber, produced a substance with new and valuable qualities.

The mere discovery of a new element, or law, or principle of nature, without any valuable application of it to the arts, is not the subject of a patent. But he who takes this new element or power, as yet useless, from the laboratory of the philosopher, and makes it the servant of man, who applies it to the perfecting of a new and useful art, or to the improvement of one already known, is the benefactor to whom the patent law tenders its protection. The devices and machines used in the exercise of it may or may not be new, yet, by the doctrine against which I contend, he cannot patent them, because they were

known and used before. Or if he can, it is only in their new application and combinations in perfecting the new art. In other words, he may patent the new application of the mechanical devices, but not the new application of the operative element which is the essential agent in the invention. He may patent his combination of machinery, but not his art.

Where a new and hitherto unknown product or result beneficial to mankind is effected by a new application of any element of nature, and by means of machines and devices, whether new or old, it cannot be denied that such invention or discovery is entitled to the denomination of a "new and useful art." The statute gives the inventor of an art a monopoly in the exercise of it, as fully as it does to the inventor of a mere machine; and any person who exercises such new art without the license of the inventor, is an infringer of his patent, and of the franchise granted to him by the law as a reward for his labor and ingenuity in perfecting it. A construction of the law which protects such an inventor in nothing but the new invented machines, or parts of machinery used in the exercise of his art, and refuses it to the exercise of the art itself, annuls the patent law. If the law gives a franchise or monopoly to the inventor of an art, as fully as to the inventor of a machine, why shall its protection not be coextensive with the invention in one case, as well as in the other? To look at an art as nothing but a combination of machinery, and give it protection only as such against the use of the same or similar devices, or mechanical equivalents, is to refuse it protection *as an art*. It ignores the distinction between an art and a machine; it overlooks the clear letter and spirit of the statute, and leads to inextricable difficulties; it is viewing a statue or a monument through a microscope.

The reason given for thus conferring the franchise of the inventor of an art to his machines and parts of machinery, is, that it would retard the progress of improvement, if those who can devise better machines or devices differing in mechanical principle from those of the first inventor of the art, or, in other words, who can devise an improvement in it, should not be allowed to pirate it.

To say that a patentee who *claims the art of writing at a distance by means of Electro-Magnetism*, NECESSARILY CLAIMS ALL FUTURE IMPROVEMENTS IN THE ART, *is to misconstrue it, or draw a consequence from it not fairly to be inferred from its language.* An improvement in a known art is as much the subject of a patent as the art itself; so also is an improvement on a known machine. Yet, if the original machine be patented, the patentee of an improvement will not have a right to use the original. This doctrine has not been found to retard the progress of invention in the case of machines; and I can see no reason why a contrary one should be applied to an art.

The claim of the patentee is, that he may be protected in the exercise of his art as against persons who may improve or change some of the processes or machines necessary in its exercise. The Court, by deciding that this claim is too broad, virtually decides that such an inventor of an improvement may pirate the art he improves, because it is contrary to public policy to restrain the progress of invention;

or, in other words, it may be said that it is the policy of the courts to refuse that protection to an art which it affords to a machine, and which it is the policy of the Constitution and the laws to grant.

2d. Let us now consider what is the nature of the invention now under consideration.

It is not a composition of matter, or a manufacture, or a machine. It is the application of a known element or power of nature to a new and useful purpose by means of various processes, instruments and devices, and if patentable at all, it must come within the category of "*a new and useful art.*" It is as much entitled to this denomination as the original art of printing itself. The name given to it in the patent is generally the act of the Commissioner, and in this, as in many other cases, a wrong one. The true nature of the invention must be sought in the specification. The word Telegraph is derived from the Greek, and signifies to "write afar off, or at a distance." It has heretofore been applied to various contrivances or devices to communicate intelligence by means of signals or semaphores which speak to the eye for a moment; but in its primary and literal signification of *writing, printing, or recording at a distance*, it never was invented, perfected, or put into practical operation, till it was done by Morse. He preceded Steinheil, Cook, Wheatstone, and Davy, in the successful application of the mysterious power or element of electro-magnetism to this purpose; and his invention has entirely superseded their inefficient contrivances. It is not only "a new and useful art," if that term means anything, but a most wonderful and astonishing invention, requiring tenfold more ingenuity and patient experiment to perfect it, than the art of printing with types and press, as originally invented.

3d. Is it not true, as set forth in this eighth claim of the specification, that the patentee was the first inventor or discoverer of the use or application of electro-magnetism to print and record intelligible characters or letters? It is the very ground on which the Court agree in confirming his patent. Now the patent law requires an inventor, as a condition precedent to obtaining a patent, to deliver a written description of his invention or discovery, and to particularly specify what he claims to be his own invention or discovery. If he has truly stated the principle, nature, and extent of his art or invention, how can the Court say *it is too broad*, and impugn the validity of his patent for doing what the law requires as a condition for obtaining it? And if it is only in case of a machine that the law requires the inventor to specify what he claims as his own invention and discovery, and to distinguish what is new from what is old, then this eighth claim is superfluous, and cannot affect the validity of his patent, provided his art is new and useful, and the machines and devices claimed separately are of his own invention. If it be in the use of the words "*however developed*" that the claim is to be adjudged too broad, then it follows that a person using any other process for the purpose of developing the agent or element of electro-magnetism than the common one now in use and described in the patent, may pirate the whole art patented.

But if it be adjudged that the claim is too broad, because the inventor claims the application of this element to his new art, then his patent is to be invalidated for claiming his whole invention, and nothing more. If the result of this application be a new and useful art, and if the essence of his invention consists in compelling this hitherto useless element to record letters and words at any distance, and in many places at the same moment, how can it be said that the claim is for a principle or an abstraction? What is meant by a claim being *too broad?* The patent law and judicial decisions may be searched in vain, for a provision or decision that a patent may be impugned for claiming no more than the patentee invented or discovered. It is only when he claims something before known and used, something as new which is not new, either by mistake or intentionally, that his patent is affected.

The act of Congress requires the applicant for a patent to swear that "he is the original and first inventor of the art, machine," &c. It requires the Commissioner to make an examination of the alleged invention, "and if it shall appear that the same *has not been invented prior to the alleged invention*, he shall grant a patent, &c. But if it shall appear that the applicant is not the original and first inventor or discoverer thereof, *or that any part of that which is claimed as new had before been invented*," then the applicant to have leave to withdraw his application.

The 13th section treats of defective specifications, and their remedy, where the applicant, through mistake or inadvertency, had claimed "*more than he had a right to claim as new.*"

The 15th section, in enumerating the defences which a defendant may be allowed to make to a patent, states that *inter alia* he may show "that the patentee was not the original and first inventor or discoverer of the thing patented, or of a *substantial and material part thereof claimed as new*," and the proviso to the same section allows the court to refuse costs, "when the plaintiff shall fail to sustain his action on the ground that in his specification or claim is embraced *more than that of which he was the first inventor.*"

The 7th section of the act of March 3d, 1837, specially defines the meaning of the phrase *too broad* to be, when the patent claims more than that of which the patentee was the original and first inventor; and the 9th section of the same act again providing for cases where, by accident or mistake, the patentee claims more than he is justly entitled to, describes it to be, "where the patentee shall have in his specification claimed to be the original inventor or discoverer of any material or substantial part, of which he is not the first and original inventor, *and* shall have no legal and just right to the same." Thus we see that it is only where, through inadvertence or mistake, the patentee has claimed something of which he was not the *first inventor*, that the Court are directed to refuse costs.

The books of reports may be searched in vain for a case where a patent has been declared void, for being *too broad* in any other sense.

Assuming it to be true, then, for the purpose of the argument, that the new application of the power of electro-magnetism to the art of

telegraphing or printing characters at a distance, is not the subject of a patent, because it is patenting a principle ; yet as it is also true that Morse was the first who made this application successfully, as set forth in this 8th claim, I am unable to comprehend how, in the words of the statute, we can adjudge "that he has failed to sustain his action on the ground that his specification or claim embraces more than that of which he was the first inventor." It is for this alone that the statute authorizes us to refuse costs.

4th. Assuming this 8th claim to be too broad, it may well be said, that the patentee has not unreasonably delayed a disclaimer, when we consider that it is not till this moment he had reason to believe it was too broad. But the bill claims, and it is sustained by proof, that the defendant has infringed the complainant's second patent for his improvement.

The Court sustain the validity of this patent. Why, then, is the complainant not entitled to his costs ? At law, a recovery on one good count is sufficient to entitle the plaintiff to recover costs ; and I can see no particular equity which the defendants can claim, who are adjudged to have pirated two inventions at once.

I am of opinion, therefore, that the decree of the Circuit Court should be affirmed, with costs.

True copy.

Test : WM. THOS. CARROLL,
C. S. C. U. S.